"Without Wrinkles"

Just in case there may be someone in your organization whose noble brow is rigid with corrugations, we want to pass along this thought on worry, written by George Horace Lorimer a great many years ago when we really had something to worry over!

"The only thing I've ever put into my business which didn't draw dividends in fun or dollars was worry. * * * I've simply found worrying a blamed sight more uncertain than horse-racing—it's harder to pick a winner at it. * * * The time to do your worrying is when a thing is all over, and the way to do it is to leave it to the neighbors."

There are many "wrinkles" in the paper business.

Customers are particular. A wrinkled roll may be the cause of a whole set of human wrinkles—and losses to the mill.

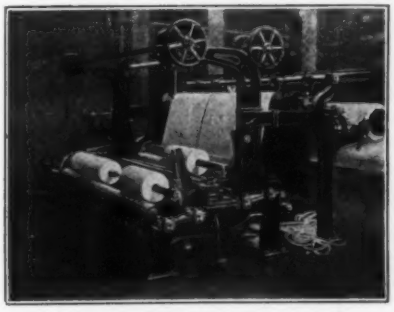
Our Winders handle successfully all grades of Book, Tissue, News and Board.

We have a customer in New Hope who says that he makes about the hardest paper in the world to wind and he asserts that, with our Winder, "We have no trouble in getting a good hard roll."

"Perfect Rolls" such as our Winders are producing for a customer in Massachusetts imply saving of waste, saving of time, continued good-will of customers.

One of the great mills in the Kalamazoo district finds that our machines mean "less waste."

If you will soon be interested in a Winder, Slitter (and Rewinder) that will do its work "Without Wrinkles," it will give us pleasure to send you information and prices.



Four-Drum Winder in operation

The Moore & White Company

Established 1886

North Philadelphia Station, Penna. R. R., PHILADELPHIA, PA.

Paper Machine Builders

Vol. 3—No. 12

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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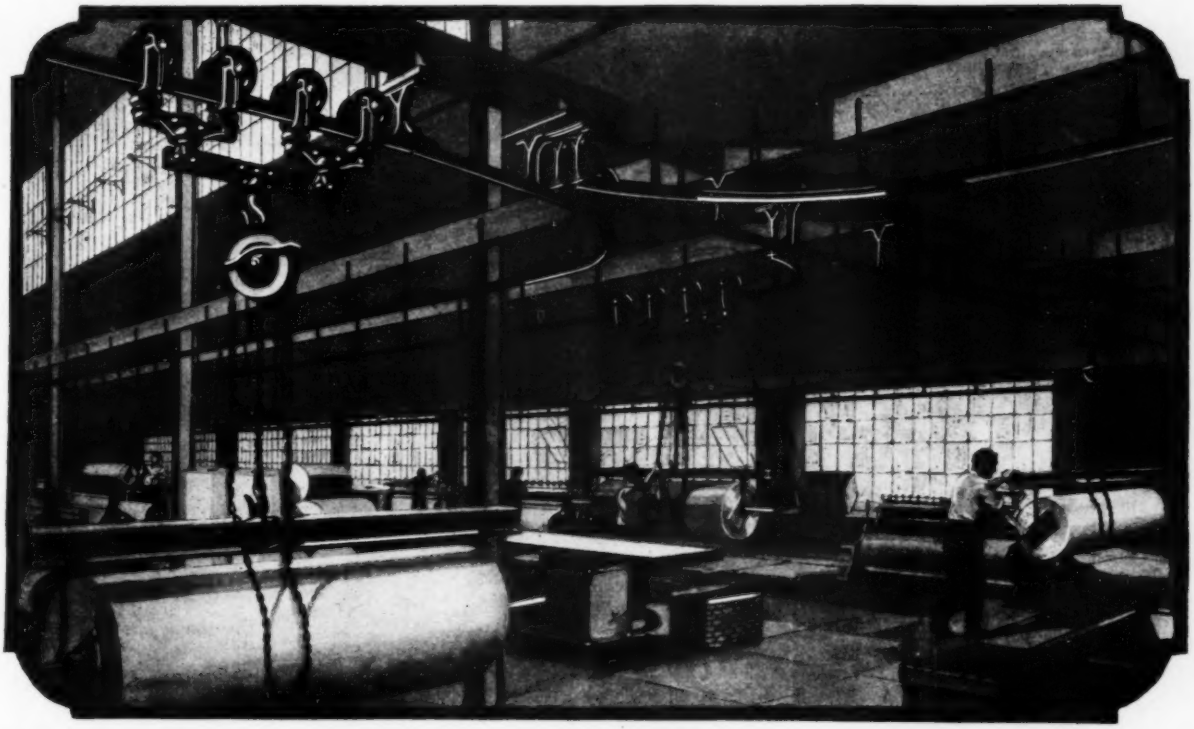


Cut Your Costs and Make More Sales

Present market conditions demand lower prices than those that have prevailed during the last few years. To maintain the quality of your product and still meet this demand you must turn to the manufacturing end of your business for those savings that will make possible lower selling prices. Analyze your factory costs. See if you don't find the handling and transferring of material one of your biggest production expenses.

LOUDEN

OVERHEAD CARRYING SYSTEM

is actually cutting material handling costs in half in thousands of plants—in every known industry. And these remarkable savings are made possible because the Louden comes and goes quickly—picks up loads of any size or shape weighing up to 2000 pounds—handles raw materials through various assembly operations—carries the finished product to warehouse or shipping platform—all at a greatly reduced labor cost. Runs easily on roller-bearing trolleys—over and around machinery—from department to department—floor to floor—building to building. With it one man can easily do the work of three.

Small Cost—Easy to Install

Your own men can install it. And you'll be surprised how little an efficient system in your plant will cost. Louden overhead equipment costing but a few hundred dollars is saving thousands every year for scores of others. Let our skilled efficiency men show you how it will save for you—how it will make possible lower selling prices for your goods—by cutting production costs.

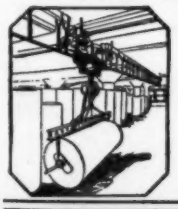
Be Sure to Send for Louden Overhead Catalog

It pictures many installations in various businesses — installations varying in size from a few feet of track to several miles. Tells how other concerns have cut manufacturing costs. Send for your copy today. *Write us — there's no charge — no obligation whatever.*

THE LOUDEN MACHINERY CO.

190 Court Street *Established 1867* **Fairfield, Iowa**

WHAT THE LOUDEN SYSTEM DOES FOR OTHERS. IT CAN DO AS MUCH FOR YOU



Saves $3000 a Year

An $800 installation in the American Seeding Machine Co.'s plant, Springfield, O., saves $3000 a year.

What a Large Steel Co. Says

We believe the Louden Overhead system the simplest, best and most durable of any system we have ever seen. Inland Steel Co., Chicago Heights, Ill.

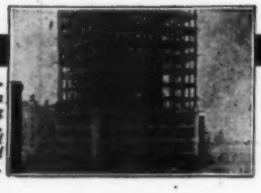
Does Work of Eight Men

In the Highland Body Co.'s Warehouse, Chicago, a $600 installation does the work of eight men—pays for itself many times each year.

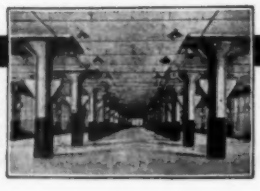
Saves Original Cost Each Year

A $2500 installation for Decorative Stone Co., New Haven, Conn., saves in labor that amount each year.

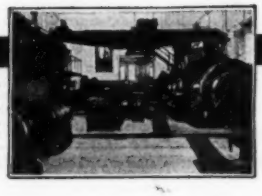
DEGR



Superior Graphite Paint—*a protective coating for structural steel, bridges, metal roofs, stacks and all metal surfaces.*



Sta White—*a pure white, light-reflecting oil paint for industrial interiors. The mill white you can rely upon. It stays white*



Degraco Paints and Enamels—*made in all colors for use on interior and exterior surfaces, for every surface requirement.*

Why Paper Mills Use Sta-White

Mills painted with *Sta-White*—the pure white oil paint—three to five years ago have been relieved of the necessity of frequent repainting. They have enjoyed a low per year cost on their paint expenditure.

When you buy *Sta-White* there's more to the transaction than so much paint for so much money. The true value of *Sta-White* is measured in years of satisfactory service.

In buying mill white paint for your mill interior insist on all the usual features—whiteness, light-reflecting qualities, etc., but buy only that paint in which these qualities are backed by service records, which assure lasting durability and low per year painting cost.

If you buy on the basis of proven merit, you will buy *Sta-White.* It has made good in the paper mill field.

We should like to place our folder "Durable Paints for the Paper Mill" in the hands of your maintenance man. It is a valuable guide to economical painting.

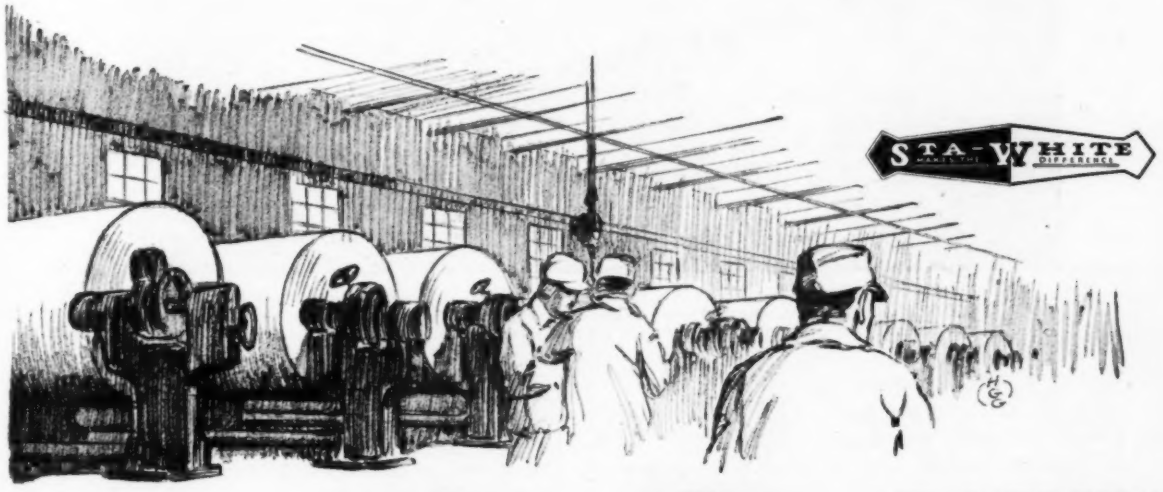
Degraco Paints are sold through branch offices with warehouse stocks in all principal Cities

Detroit Graphite Compnay

Makers of Paints in all Colors for all Purposes
557 Twelfth Street : Detroit, U. S. A.

Made in Canada by Dominion Paint Works, Limited, Walkerville, Ont.

(113)

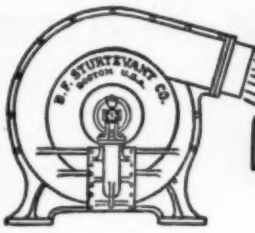


ACO PAINTS VARNISHES ENAMELS

Degraco Brick and Concrete Paints—*for interiors and exteriors Concrete Walls, Floor Hardener, Damp-proofing.*

Degraco-Tone *an oil paint in flat finish for interior use on Plaster Walls, Woodwork, Wall Board, Concrete, Tile, Metal.*

Degraco House Paints—*all colors for exterior and interior surfaces. High quality and durability assure low ultimate cost.*



Sturtevant

REG. U.S. PAT. OFF.

PUTS AIR TO WORK

Vapor Absorption Systems

Falulah Paper Co., Fitchburg, Mass. Sturtevant Vapor Absorption System installed on Fourdrinier Machine, equipped with dryer felts on the bottom but not on top.

The Sturtevant nozzles can be clearly seen on the photograph. This machine is very closely hooded, and this type of hood represents one of the best types for this work. It is almost impossible for the air to escape from under the hood. The air is removed not through the roof but through the side wall, since the hood is connected on the side to a Sturtevant Propeller Fan.

Submit your problems to us or the J. O. Ross Engineering Corporation of New York

B. F. STURTEVANT COMPANY

HYDE PARK **BOSTON, MASS.**

Sales Engineering Offices Located in

ATLANTA	DALLAS	NEW YORK	SAN FRANCISCO
BOSTON	DETROIT	PHILADELPHIA	SEATTLE
BUFFALO	HARTFORD	PITTSBURGH	WASHINGTON
CHICAGO	KANSAS CITY	ROCHESTER	GALT and
CINCINNATI	LOS ANGELES	ST. LOUIS	TORONTO, ONT.
CLEVELAND	MINNEAPOLIS	SALT LAKE CITY	MONTREAL

Sinews of Industry

Time-tried and Powerful

A dominating factor in every industry, where belt driven machinery regulates the output, is **the belt lacing.**

Nothing needed but a hammer to apply it—and you already have a hammer.

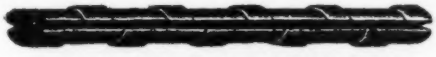
The belt joint, in reality, is an important connecting link between profit and loss. It carries the belt over and under and around the pulleys, bearing the weight of machinery overloads.

With Alligator Steel Belt Lacing, **positive** belt power is assured with the **minimum** of slow downs or stops which **means** full value secured from machinery and men—**profit protection for you.**

Investigate Alligator Steel Belt Lacing — and employ it now before further time loss occurs. Before someone says "Why don't you use Alligator?" Then you'll be sure of your belts' efficiency—joined properly and securely with "The World's Strongest Belt Lacing."

Used Satisfactorily On All Sizes of Belting

A shop foreman will feel that "Alligator" is his lacing, made just to meet his conditions. A knitting mill will use "Alligator" as its special ally. A brick and clay plant will feel secure with "Alligator" on its pug mill and other drives. A printer will search his town for baby "Alligator" for his tapes. A mining engineer will hail "Alligator" for his crusher drive as well as his lighter belts.



Rocker pin makes possible the use of a hinge belt joint in damp places and under heavy loads where a rawhide pin will not stand up.

Industrial engineers acclaim "Alligator" as their Lacing because of its wide range of utility.

Simple, Rapid, Efficent

As illustrated, only a hammer is required to apply Alligator Steel Belt Lacing. Anyone can do it and in an average time of three minutes. There is a size for every belt from tape up to five-eights inch thickness.

And "Alligator" lacing is scientifically correct. In the accompanying illustration, see how the teeth penetrate the belt lengthwise of the pull in order not to cut the belt cross-wise. This leaves the long burden bearing grain or fibres intact—no holes punched, no injury to belt ends. The result, longer steadier service from belting, which means lower upkeep costs—an item worth the utmost consideration.

Actual size of No. 25 Alligator for single leather or 4-ply fabric 3-16 to 9-32 thick. Note double staggered teeth.

Recommended by Good Belting Manufacturers

The first belting manufacturers to recommend "Alligator" some years ago were those who realized that it made the most tenacious joint. A strong testimonial. Others followed, until today, the leading manufacturers of good belting recommend it.

Investigate "Alligator"

If you happen not to use Alligator Steel Belt Lacing, let us send you a sample joint, our literature and information of a convenient source of supply. Use the coupon.

FLEXIBLE STEEL LACING CO.

4675 Lexington Street : Chicago, U. S. A.

135 Finsbury Pavement E. C. 2, London

FLEXIBLE STEEL LACING CO.,
4675 Lexington Street, Chicago, Illinois

Gentlemen: Kindly send a made up sample of Alligator Steel Belt Lacing, your descriptive literature and indicate a convenient source of supply.

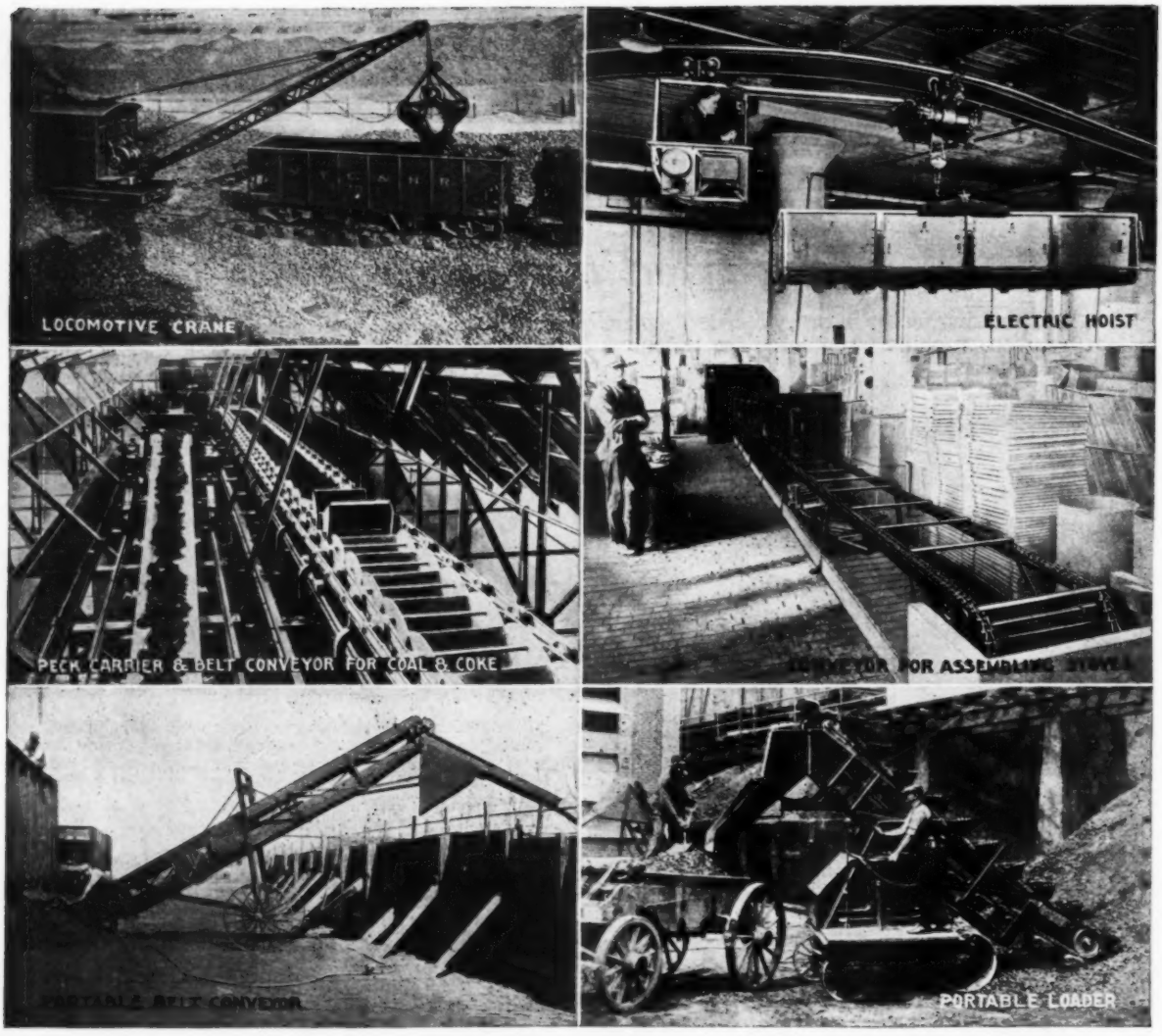
Name of Company.....

Address.....

.....

Name of Inquirer.....

ALLIGATOR
TRADE MARK REG. U.S. PAT. OFFICE
STEEL BELT LACING



Link-Belt Equipment for Cutting Handling Costs

THE cost of handling materials is an important factor in maintaining low production costs.

Thru many years of experience we have developed machinery that will handle raw or finished products economically, and which requires little attention or labor, operating almost automatically.

The above are a few typical illustrations of Link-Belt machinery.

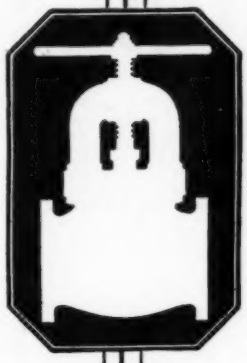
To find out whether there is a more economical way of handling your material, talk the matter over with our experienced engineers.

PHILADELPHIA CHICAGO LINK-BELT COMPANY INDIANAPOLIS TORONTO

New York - - Woolworth Bldg. Wilkes Barre - - 2d Nat'l Bank Bldg. Seattle - - - 820 First Ave. S. Louisville, Ky. - - F. Webb, Starks Bldg.
Boston 9 - - - 49 Federal St. Huntington, W. Va. - Robson-Prichard Bldg. Portland, Ore. - - - First and Stark Sts. New Orleans - -
Pittsburgh - - - 1501 Park Bldg. Cleveland - - - 429 Kirby Bldg. San Francisco - - - 168 Second St. C. O. Bliss 504 Carondelet Bldg.
St. Louis - - Central Nat'l Bank Bldg. Detroit - - - 4210 Woodward Ave. Los Angeles - - 183 N. Los Angeles St. Birmingham, Ala. - -
Buffalo - - 547 Ellicott Square Kansas City, Mo. - - 306 Elmhurst Bldg. Denver Lindroth, Shubart & Co., Boston Bldg. S. L. Morrow, 720 Brown-Marx Bldg.
In Canada - Canadian Link-Belt Co., Ltd., Toronto and Montreal H. W. CALDWELL & SON CO., CHICAGO, 17th and Western Ave. NEW YORK, Woolworth Bldg. DALLAS, TEXAS, 709 Main St.

906

LINK-BELT



LUNKENHEIMER

Globe, Angle, Cross and Check Valves

Standard, Fig. 1123
Extra Heavy, Fig. 884

Service economy—long life with a minimum cost for upkeep, is the dominant factor which has led to the selection of LUNKENHEIMER Iron Body Valves as "standard equipment" in many leading plants.

Their success in service is the direct result of the combination of correct design with proper materials and the LUNKENHEIMER method of manufacture.

LUNKENHEIMER "Valve-iron" and LUNKENHEIMER "Valve-bronze" are formulated especially for valve service and the LUNKENHEIMER method of manufacture insures dependable results under prescribed operating conditions.

The line embraces a variety of types and sizes, in Standard and Extra Heavy Patterns for pressure up to 125 and 250 pounds respectively, whose performance and durability fully measure up to the LUNKENHEIMER *high quality standard*.

There is a LUNKENHEIMER Distributor in every commercial center ready to give prompt service. Specify LUNKENHEIMER Iron Body Valves and insist on getting what you specify. Write for Catalog 58-FG.

THE LUNKENHEIMER CO.

"QUALITY"

LARGEST MANUFACTURERS OF
HIGH GRADE ENGINEERING SPECIALTIES
IN THE WORLD

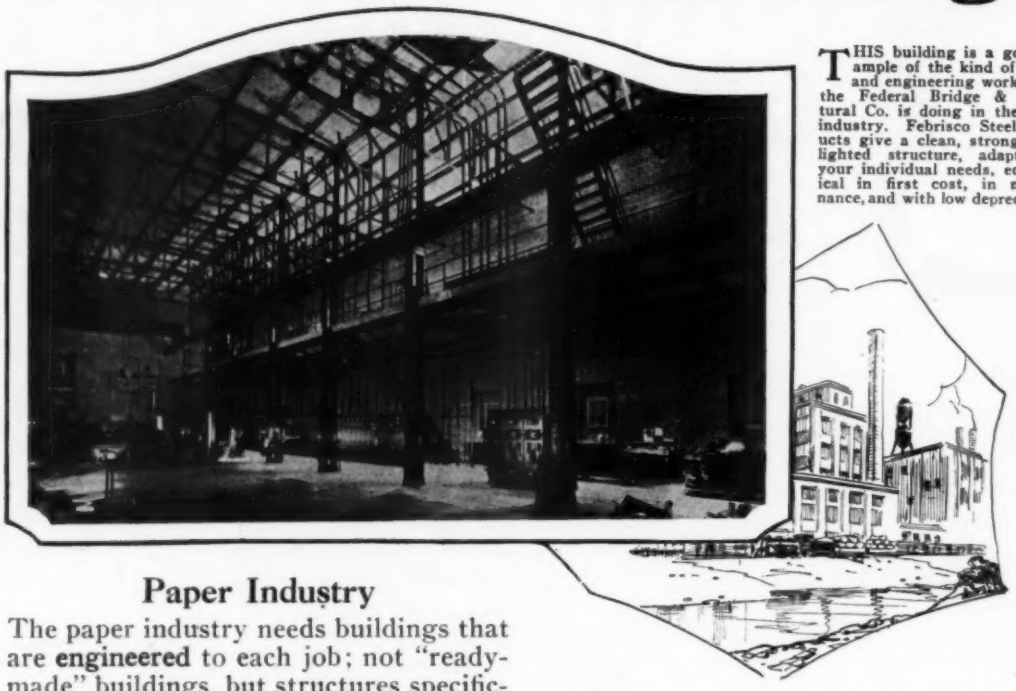
NEW YORK CHICAGO **CINCINNATI, U. S. A.** BOSTON LONDON

EXPORT DEPT. 129-131 LAFAYETTE ST., NEW YORK

13-19-67

AMERICA'S BEST
LUNKENHEIMER
"QUALITY"
SINCE 1862

Your New Building



THIS building is a good example of the kind of design and engineering work which the Federal Bridge & Structural Co. is doing in the paper industry. Febrisco Steel Products give a clean, strong, well-lighted structure, adapted to your individual needs, economical in first cost, in maintenance, and with low depreciation.

Paper Industry

The paper industry needs buildings that are **engineered** to each job; not "ready-made" buildings, but structures specifically designed for the paper industry.

"Specifically designed" is the slogan of our service to the paper industry. We design and engineer the building to give the best arrangement of your equipment, so that the building not only houses but helps your production. Federal engineers are experienced in the design of all the buildings needed in the paper industry from the smallest to the biggest warehouse.

A New Engineering Service

This means a **new engineering service.** We will bring to **your** building problem the advice of engineers of broad experience in your industry. We will supply all the steel and steel sash for the structure. We will give you or your contractor all the plans and specifications needed for the erection of the complete building. All this service costs you nothing.

You cannot afford to miss this opportunity to get the service of the best structural engineers in the country. Write today, giving full details of your proposed buildings, of extensions, the general dimensions you have in mind, the purpose of the buildings and any other data that may be necessary. Without obligation we will then send full particulars of a structure or structures which will adequately meet your needs, render you efficient service and cost the least money.

FEDERAL BRIDGE AND STRUCTURAL COMPANY

STEEL **FEBRISCO** PRODUCTS

GENERAL OFFICE AND WORKS: WAUKESHA, WISCONSIN

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CHICAGO, ILLINOIS MILWAUKEE, WISCONSIN APPLETON, WISCONSIN

WATERLOO, IOWA SIOUX CITY, IOWA

DENVER ENGINEERING WORKS COMPANY, DENVER, COLORADO

Buy Now

PROPERLY compensated production makes the United States wealthy.

The greatest producers of wealth in the United States are the agricultural classes.

Agricultural production in 1920 totaled twenty billion dollars.

Agriculture, therefore stands at the top of wealth production in the United States. But agricultural production was not properly compensated in 1921. Prices on farm products swung down in some cases below pre-war figures.

It was this factor that cost us the volume of business in 1921.

The rural population in the United States, fifty-one millions of people, were not potential purchasers of commodities in 1921.

But the turn came at the beginning of this year. Since January 1st wheat has advanced 45%; corn has almost doubled in price; oats have advanced 45%; hogs advanced from $6.50 to $11.40 per cwt. in the Chicago market last week. Corn fed to hogs pays from 80c to $1.00 per bushel; sheep have doubled in price; rye, barley and other coarse grains as well as cattle have also advanced materially so that today the agricultural classes are receiving proper compensation for the product they have to sell and can look forward to a continuance of these prices during 1922.

We need to remember that the advance in all agricultural prices has not been brought about by any local conditions or local speculation in the United States. It has come about because the reserves of food in the world are at a critically low point and the world, as Mr. Ogden Armour recently said, needs all the United States can produce, and will have it!

We need also to remember that with the substantial upturn above noted in all farm products, there will follow in consequence a rise in the cost of living.

We need also to remember that the rise in the cost of living means there will be no further decline in wages and salaries. And as wages and salaries make up about 75% of the cost of commodities, that, in turn, means that there will be no further decline in commodity prices.

In other words, we have at last reached the stabilizing basis, and with fifty-one millions of people in the United States re-entering the markets this year as potential purchasers, we can look forward with confidence to a bigger, better business in 1922.

The paper business is dependent upon the activity of general business for its volume; when general business is moving in large volume more letters are written, more ledgers are open, more newspapers circulated, more magazines read, more wrapping paper required, more paper boxes and other products used. It is this situation that is immediately ahead of the business men in the United States.

As is always the case, some time will elapse before the general run of the buying public will recognize that values are stable and will enter the markets actively. Every day the bank clearances all over the country are gaining, denoting the volume of business done week by week. Frozen credits in the West are being released; debts are being paid, all of which is being reflected in the statements of the Federal Reserve Bank.

The statement of the Federal Reserve Bank of Feb. 25th, was little short of sensational. In the week of the 15th, the reserve ratio of the twelve reserve banks was 76.4; the following week the ratio of the twelve reserve banks was 78.1, but the ratio of the New York Federal Reserve showed a most remarkable change, advancing from 81.9 on Feb. 15th, to 87.1 on Feb. 21st; an advance of 6.2% in one week. The Federal Reserve Bank had on that date outstanding $2,225,000,000 Federal Reserve notes, and a liability deposit of $1,772,000,000 against which they held $2,945,000,000 of gold, or $1.30 of gold against every Reserve Bank note in circulation.

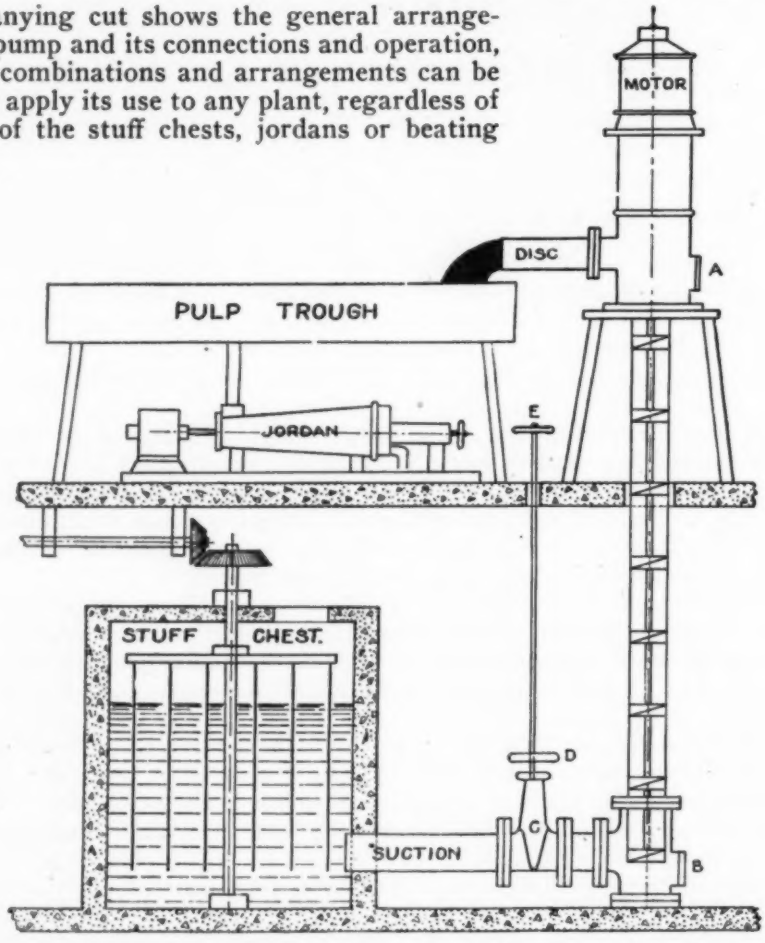
With a plethora of credit in the country and with money down to 4½% and going lower, with the agricultural classes now being properly compensated for their production, and the world wanting all that America can produce, the time has come in the judgment of The Paper Industry, to purchase commodities. Remember the old adage by which money shall be made, "Buy when everybody wants to sell, and sell when everybody wants to buy." This is the time to buy!

GREGG

Paper Mill Propellor Stuff Pump

This is a vertical rotary type of pump and does not contain any valves or contracted passages, or chambers for the stock to lodge in and is absolutely reliable and dependable in every way and superior to any type of stock pump heretofore used by the paper trade.

The accompanying cut shows the general arrangement of this pump and its connections and operation, but different combinations and arrangements can be made so as to apply its use to any plant, regardless of the location of the stuff chests, jordans or beating engines.

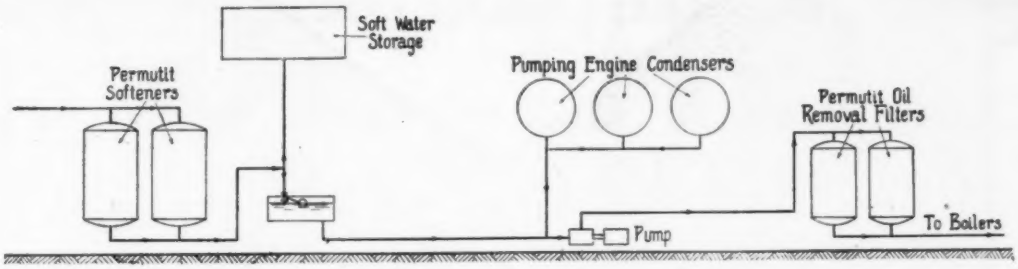


The capacity of this pump can be regulated by the gate valve in the suction line; this makes it a very flexible and easily handled pump. The action of the propellors keeps the stock broken up and agitated while on its passage through the pump, so that heavy stock or stock with pieces of metal, rope or sticks in same can be handled with safety For examination or in cleaning the pump the hand hole plates "A" & "B" can be removed and a stream of water turned in opening "A" and the pump washed out thoroughly in a few moments and placed in service again.

MANUFACTURED BY

GREGG PUMP COMPANY

127 and 129 Southwest Blvd. **KANSAS CITY, MISSOURI**



A Battery of Boilers That Have Not Been Cleaned Since 1915

A MUNICIPAL pumping station in Ohio operates a boiler plant consisting of 4 B & W horizontal return tubular boilers, normal rating 120 H P each. The boiler feed water is condensate which passes through two Permutit Oil Removal Filters, that remove all oil and grease and is then made up with water containing about 20 grains of hardness per gallon.

In spite of every effort to treat this water supply, scale formed with surprising rapidity and it was necessary to keep one boiler down and a cleaning gang at work continuously. Boiler tube replacements and repairs with resultant labor charges, made a big addition to their operating costs, while several boiler breakdowns caused serious trouble in the pumping plant operation.

The superintendent of the plant was far from satisfied with this situation, and being a very progressive engineer he determined to cut down his high operating costs. Accordingly a thorough investigation of all types of water softening apparatus was made, which resulted in the installation, in August, 1915, of Permutit Zeolite Water Softening Apparatus, that removes the entire 20 grains of hardness from the make-up water. Noticeable economies were immediately effected.

All trouble from scale stopped; the cleaning gang was dispensed with, while tube replacements and repairs decreased to practically nothing. The boilers steamed much better because the tubes were always clean, and considerable quantities of fuel were saved. The following figures were taken from the city records for corresponding months:

	Water Pumped	Coal Consumed	Water Per Lb. of Coal
March, 1915	195,010,249 gals.	549,187 lbs.	355 gals.
March, 1916	209,533,957 gals.	451,484 lbs.	464 gals.

This represents an increase of 109 gallons pumped per pound of coal, or a gain of 30.7 per cent in duty. A letter from the superintendent, dated November 21, 1921, (after 6 years of operation) stated:

" . . . Since we have used this system we have not cleaned boilers but once, and that was about a month after the system was put into service and the reason we cleaned then was to remove the loose lime."

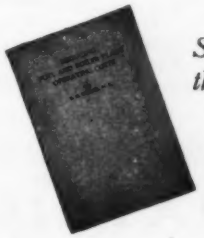
How much money have YOU spent for boiler cleaning and repairs since 1915? Let us help you investigate your problem—write today.

The Permutit Company
440 Fourth Ave. New York

Zeolite Water Softener Patent Sustained

The Federal Court at Buffalo (Hazel, J.) on June 15, 1921, handed down a decision sustaining our broad patent covering Zeolite Water Softeners which has been affirmed by the Court of Appeals. According to this decision all Zeolite Water Softeners on the market not made by us are an infringement of this patent.

No need to borrow trouble — buy Permutit—it is the best anyway.



Send for this free booklet

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Please send me your free booklet, "Reducing Fuel and Boiler Plant Operating Costs."

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Every user of Liquid Chlorine will be interested to learn of the development of the

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Multiple-Unit Chlorine Tank Car

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A Safe and More Economical Method of Shipping Liquid Chlorine

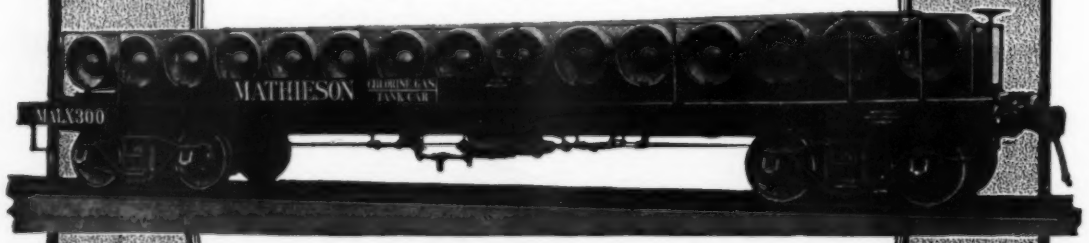
This new idea consists of a specially designed car carrying 15 one-ton individual containers.

Individual tanks are convenient and safe to load, ship, handle and store, and deliver the full quantity of liquid purchased. Constructed of seamless forge-welded steel, pressure tested to 500 pounds per square inch, which comply with Interstate Commerce Commission specifications.

The entire metal of each container is available for inspection at all times. Individual units cleansed and inspected before each charging.

It is the New and Practical Way to Buy and Ship Liquid Chlorine in Bulk Quantities

We'll gladly send detailed information to those interested



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EDITORIALS

Education and Fuel Conservation

THE average steam plant wastes one-quarter of its fuel. The domestic consumer of fuel is even more wasteful than the industrial consumer. The mineral fuels can never be replaced. Once exhausted they will be gone forever, and there is not—as is popularly supposed—an inexhaustible supply. We are told that oil is going fast, that anthracite will soon be gone and that the thick-vein low volatile coals of the eastern field are almost gone. The problem of fuel conservation is, therefore, one of world importance to all of the people of all the world.

The many problems that have a bearing upon fuel economy are of vital importance to the individual fuel consumer. He pays for the fuel that he uses and his annual bill depends upon two things; viz., the price per ton or per gallon that he must pay and the quantity that he uses. He has no control—or at the best, the most remote control—over prices, but he does have a large measure of control of the quantity that he uses. The average consumer can reduce the quantity of the fuel that he uses by possibly as much as 25 per cent. This is the estimate of many competent engineering authorities.

Let us, for example, suppose an industrial concern needlessly wasting one-quarter of its fuel. A medium-sized paper mill uses about one hundred tons of coal daily, and this means at least $500 a day for coal. Twenty-five per cent of this is $125 a day. If your plant uses less, the saving would be less, but if it is more, the saving would be more. Figure it yourself. Every dollar that is saved to the fuel account can be passed to the dividend account. Every stockholder of every paper or pulp making company relying upon steam power should be deeply concerned with the fuel bill, because fuel is one of the very large items of manufacturing expense.

We have entered upon days of very sharp competition, and the industries to survive will be those that give close attention to the costs of production.

Fuel economy depends primarily upon the education of all those who have anything to do with the final uses of fuel—from the manager in his office down to the men who actually burn the coal. Knowledge is necessary, no matter how refined the equipment for the utilization of the fuel may be. The more refined the equipment, the more refined the knowledge must be.

The United States Fuel Administration, very early in its short-lived career, realized that education was the real key to fuel economy, and it set about a campaign of instruction. The work of the Fuel Administration came to an end with the close of the Great War, but in giving up its campaign it reported as probably its most important finding and message to the country, that the work of conservation must go on primarily through the better education of the American citizen in the theory and practice of combustion. The man who studies fuel economy is certain to effect fuel economy.

It is therefore necessary that every paper mill president, manager, superintendent, engineer, etc., secure all the possible knowledge they can on the best methods for handling and utilizing coal. We cannot afford longer to waste anything.

A New Series of Safety Articles

THE PAPER INDUSTRY has done its best during the past two years to keep the subject of safety before its readers, by publishing data from time to time showing the effects that accidents have on production, and the publication of articles, written specially by the engineering staff of the National Safety Council, showing the pitfalls in accident prevention and how to avoid them.

About 150 of the principal paper and pulp mills in the United States and Canada are enthusiastic members of the National Safety Council. These mills are continually concentrating their efforts toward human conservation, and the result is a much reduced loss in production and a higher standard of morale among the employees.

The Paper Industry is now pleased to announce that by an arrangement with the National Safety Council, a series of articles dealing with each department in the industry will be published in following numbers. The first of these articles appears in this issue and is written by Mr. Walter A. Gleason, of the Hammermill Paper Company, chairman of the Paper and Pulp Section of the National Safety Council. It treats on the Yard Department, which includes loading, unloading and piling material used in the manufacture of paper, and hand tools peculiar to the industry.

Later subjects will be as follows:

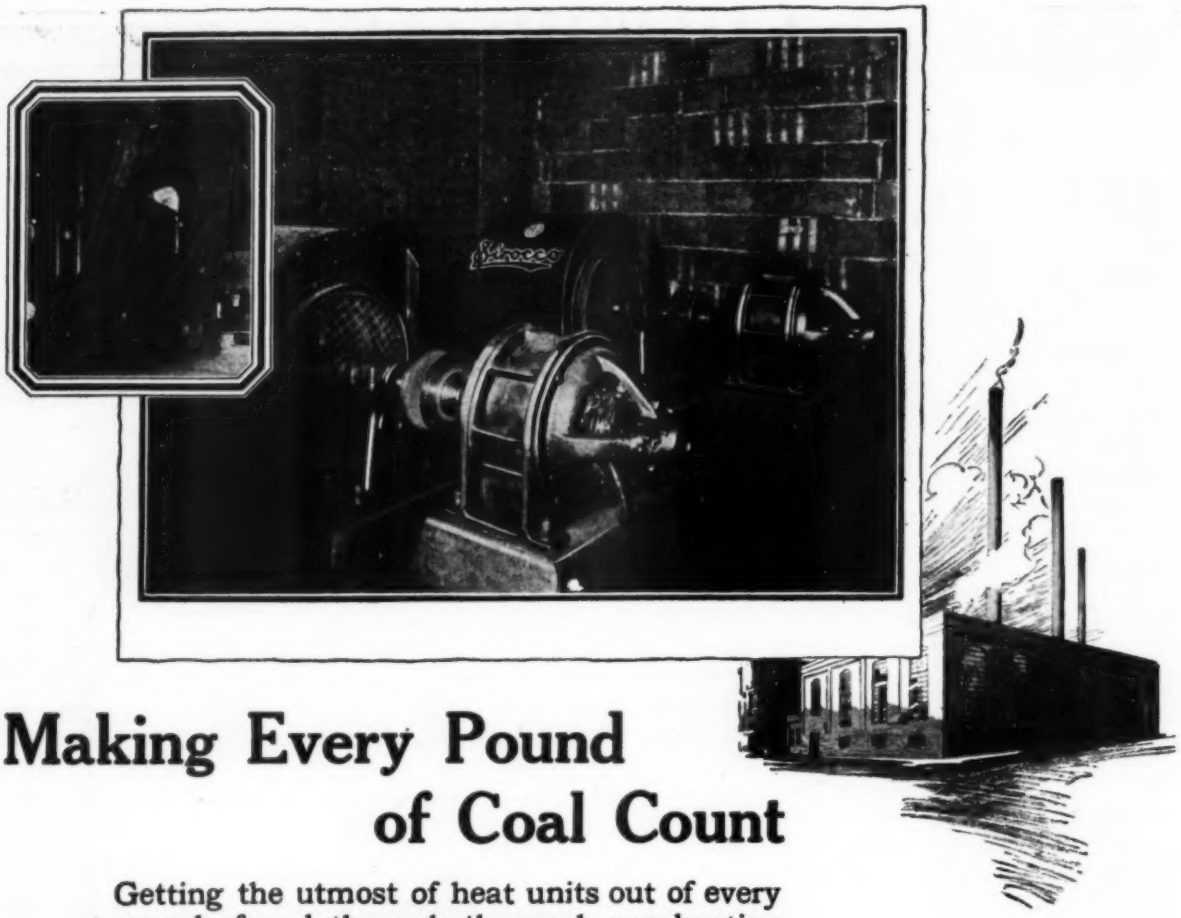
WOOD ROOM—Hand tools, handling wood on and off conveyors, sawing, barking, washing and chipping wood, chip bin dangers.

SULPHITE MILL—Digester hazards, wet floors, screening and washing stock, handling and mixing bleach.

BEATER ROOM—Trucking and piling stock, wet and slippery floors, carelessness around beating engines.

PAPER MILL—Drying, calendering, rewinding paper.

FINISHING ROOM—Cutting, trimming, sealing, packing and shipping.



Making Every Pound of Coal Count

Getting the utmost of heat units out of every pound of coal through thorough combustion of fuel—economical operation of the power plant is assured with "Sirocco" Mechanical Draft Fans.

Operated with automatic stokers, "Sirocco" Fans (forced or induced) are helping to reduce the fuel bills of hundreds of public service corporations.

Our engineers are particularly well qualified to cooperate with you in selecting the right kind of Mechanical Fans. Write for descriptive bulletin.

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BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

(34)

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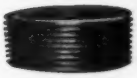
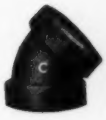


WHETHER it be the smallest auxilliary pipe fitting on a drainage or heating system, or an especially designed and constructed fitting for the transmission of acids or high pressure steam in an enormous power plant,

CRANE SERVICE

stands ready to fulfill the most exacting demands, and is conveniently located in more than one-hundred branches, offices and exhibit rooms in the leading cities throughout the country.



We are manufacturers of about 20,000 articles, including valves, pipe fittings and steam specialties, made of brass, iron, ferrosteel, cast steel and forged steel, in all sizes, for all pressures and all purposes and are distributors through the trade of pipe, heating and plumbing materials.

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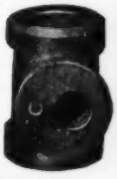

You are cordially invited when in Atlantic City to make the Crane Exhibit Rooms (1105-1107 Boardwalk) your headquarters. We will be glad to receive any mail addressed to you in our care.

Works:-
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Correct Lubrication for Paper and Pulp Mills

Made of pressed steel, strong and light, hinged cover, die-cut threading.

Thoroughly self-acting and adapted for a great variety of purposes.

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Reduce Maintenance, Oil and Power Costs to the Lowest Terms

CUPS are made from one piece of steel. Nothing to get out of order. Just fill the cup with a good grade of oil; the oil rising by capillary attraction from the cup to the bearing. The law of capillary attraction is definite and positive and can always be relied upon absolutely. The flow of the oil can be stopped and started at will, and by increasing or decreasing the number of strands of wick any desired rate of feed may be obtained.

Write for our circular "P."

There is no time like NOW to mail the coupon below. It's the first step towards cutting down lubrication bills.

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Gentlemen:—We wish to take advantage of your 60-day free trial offer, and the size cups checked are the oilers to send.

☐ ½ oz. ⅛"-¼"
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☐ 3 oz. ¼"
☐ 3 oz. ⅜"
☐ 5 oz. ⅜"-½"
☐ 10 oz. ⅜"-½"

Name .....

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Business Sense

Concentration

By IKE KENNEDY

MIND over matter—do you believe in it; if not, why don't you?

What we are all thinking about right now is exactly what is going to happen in its due season

We all had some sort of a vague idea about a year ago that something was going to happen to us—we didn't know what it was; we felt it coming, we didn't allow ourselves to speak about it above a whisper. We laughed and poohooed at the other fellow for suggesting such a thing—but honestly we knew we were feigning tranquillity that had its forebodings. The old boat had sprung a leak; we all did exactly what we should have done—we did not start a panic. We sneaked off quietly to our staterooms and strong boxes and adjusted a life preserver and wore it under our vest, or, like the adventist, crawled on top of our haystack to await the crack of doom, put on our ascension robes and settled down to a peaceful snooze, when some boys came along and set fire to our place of safety, and, suddenly awakened, bewildered and in smoke, exclaimed: In Hell, just as I expected.

For some time we have been trying to think ourselves out of a bad situation. Then the thing had reached a stage where it had us all thinking—really guessing.

Have you noticed the difference in the way people are really talking now? They've lost that melancholy stuff about "it might be worse," that "dry grin job" about all being in the same boat. People are not looking for trouble now—at least not going out to meet it.

They are beginning to talk about something which has passed—not about something dreadful which is on the way.

They are beginning to swap yarns about past adventures, comparing notes on past hardships and hair-breadth escapes, and when they do this we know the pathos of the thing, the fury of the situation has spent itself.

Now then all together, let's all concentrate on one thing—the success and welfare of the immediate future. Let's write this chapter as we want it written.

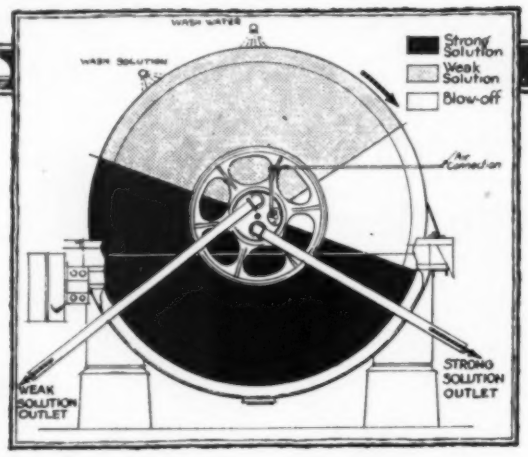
The future is assured. We've played the bear market to a finish. We've upset the confidence of the world. Now then let's get back on the side of the bulls.

This is no idle talk about people thinking differently—being more hopeful and more eager than they have ever been to do something in a big way; it's in the very air.

The ground hog saw his shadow, yes—don't blame him for seeking cover, you saw yours and you used about the same amount of head work, only you have been buried for a longer term.

The fourteenth of February was mating time. Why not match your wits and your dollars with some worthy enterprise. Make prosperity a regular epidemic by rubbing some of your own enthusiasm into every fellow you meet. Give him the high sign of 22 before it's "23" for him.

Get the California spirit—the one White Spot in the world where they have not been troubled by the other fellow's troubles.



how the OLIVER segregates wash water automatically

KEEPING the wash water separate from the filtrate is a vital necessity in most filtering operations. This the Oliver does by an automatic valve which controls the whole cycle of filtering operations.

Stage 1. The black sector shown in the drawing represents the area of initial filtration which is drained by the strong solution outlet pipe.

Stage 2. As each section of the revolving drum enters the grey sector, a wash is applied which is automatically diverted by the valve to the weak solution outlet.

Stage 3. As the washed and dried cake enters the white sector the vacuum is automatically replaced by compressed air which blows the cake off onto the scraper.

The Oliver separates black liquor from the pulp maintaining it at practically the same density as it comes from the digestors. A thoroughly washed cake is continuously discharged and clean black liquor is returned to the evaporators.

The Oliver will effect enormous savings at your plant with most efficient results. Our specialists will give you an unbiased report and accurate data without obligation to you if you will submit a brief description of your present method, stating the quantity and kind of pulp handled.

Other Oliver Products

- Oliver Vacuum Pumps
- Oliver Air Compressors
- Oliver Centrifugal Pumps
- Oliver Worm Gear Speed Reducers
- Olivite Acid Proof Centrifugal Pumps

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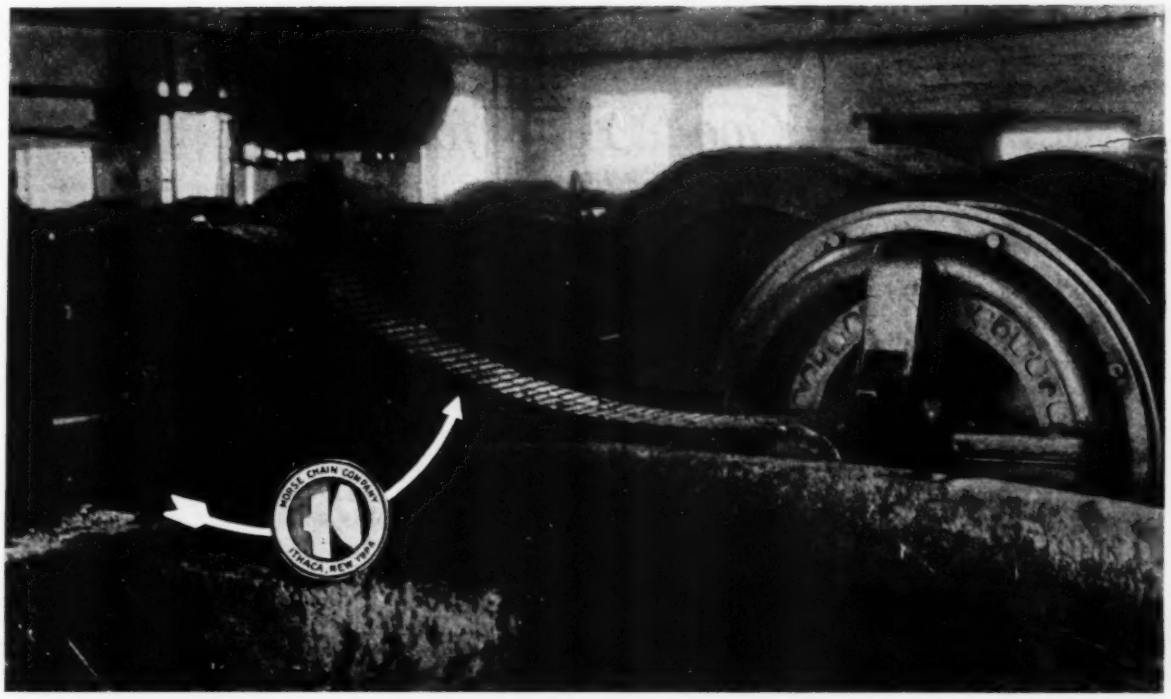
The Sign of Durability

Positive as Gears

Flexible as a Belt

Longer Life



Twenty-four Hours a Day—Five Years

The above illustration shows one of the beating engines in the plant of the Rubberoid Company, Joliet, Ill., working on pulp for the manufacture of roofing paper, one of the hardest stocks to handle in a beating engine.

The eight beating engines in this plant are equipped with eight 75 H. P. motors, furnishing power direct to the beaters by Morse Chain Drives.

A Morse Silent Chain also drives the paper machine line shaft in this mill.

All drives were installed in 1917 and have given satisfactory service ever since, running twenty-four hours a day with only minor repairs.

Morse Chains are 99% efficient, silent, durable and economical to maintain.

If you have unusual conditions of wear and exposure, or if you are losing production and increasing your cost through belt slip, you should talk to our engineers about the installation of Morse Chain Drives.

Our engineers are experts and will tell you frankly whether or not Morse Chains will be the solution to your troubles.

Write today for booklet

MORSE CHAIN CO., LARGEST MANUFACTURERS OF SILENT CHAINS IN THE WORLD **ITHACA, N. Y.**

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The year 1922 is going to be a good year for hustlers.

Big results will be achieved by those firms that work and fight and hustle, always with the thought of making their product better, and thereby to more and more please the customer.

For 25 years we have been working, fighting and hustling to produce the best possible wires that human ingenuity could produce, and the net result is the satisfaction of knowing that when a mill once uses our wires they know that

"Appleton Wires Are Good Wires"

APPLETON WIRE WORKS
APPLETON, WIS.

"Mead Co-operation"

IN THE December, 1921, issue of Mead Co-operation, the house organ of the Mead Pulp and Paper Company, Chillicothe, Ohio, there appeared an article on good-fellowship by President G. H. Mead, entitled: "Mead Co-operation."

Mr. Mead has had much to do with the building up of his company, and has had more to do than anyone else with the ideal working conditions enjoyed there. He is well known among his employees, who have learned to love and respect him for his high ideals and unfailing word of honesty and integrity. For its value as a talk on Co-operation, we publish the complete article, as follows:

"The name of this magazine, in the selection of which I had no part, has been a constant satisfaction to me, and it therefore seems proper, that in making a first formal contribution, I should choose it for a subject.

"We read of the necessity for co-operation in industry between capital and labor, or between employers and workers. Perhaps a simple definition of Co-operation is, the working together of a group of individuals for a common result. But what does Mead Co-operation mean?

"To my mind it means a closer understanding between stockholders, the management, and men and women engaged in the operation of this company, than has ever been had before in the operation of any company.

"It means the development of a spirit of harmony and good feeling in work and in play on the part of every member of this organization, that surpasses any such feeling yet known in industrial work. And it means the fulfillment for you and for me of an ambition to appreciate and enjoy our lives because of the understanding and spirit andgood feeling that we know exist in our daily work.

"Now what are the practical points to be taken into account in the development of this Co-operation; and is the organization of which we are a part working conscientiously to this end?

"One of the foremost English authorities who has made a life study of the solution of the Industrial Problem of the World has recently named five essential principles which I believe fairly cover the situation:

"1. Earnings (of the individual) sufficient to maintain a reasonable standard of comfort.
"2. Reasonable hours of work (giving sufficient time for recreation and home life).
"3. Measures provided for protection against times of unemployment, sickness and old age.
"4. A reasonable opportunity on the part of all for determining conditions of work.
"5. An interest in the prosperity of the industry in which engaged.

"I believe our company is offering a solution to each of the five above principles.

"It at all times tries to fix wages on a fair basis.

"It approves of reasonable hours to work.

"It is gradually developing plans to cover the problem of unemployment in times of depression, and of compensation in times of sickness and at old age.

"(However, the correct solution of the problem is difficult and will require the combined effort of us all for several years.)

"It has an active and very able Mill Council for the regular consideration of working conditions and many other problems.

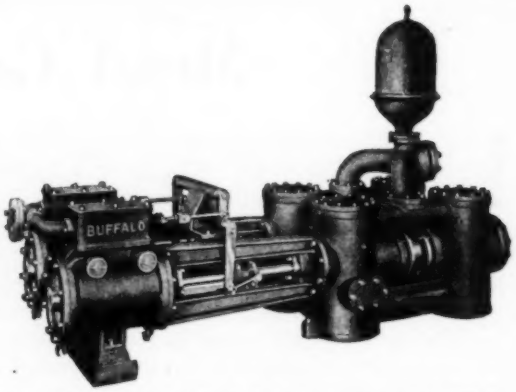
"It has provided a stock-subscription plan by which all permanent employees may become stockholders, and, therefore, partners in the company, and thus share in its profits. (And further developments may be hoped for along this line.)

"In all of this work we are only at the beginning of our development. There are opportunities for co-operation that we but vaguely see today, which in the future will increase our value to one another and to the company, far beyond anything so far imagined; and I appeal to every man and woman in this, our company, to give thought and assistance to such work.

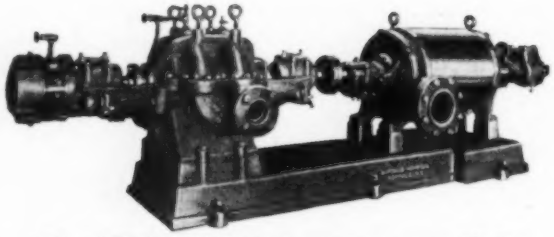
"Let us make this company one above all others in which we desire our children to do their life work. Let us set an example to the industry in which we are engaged for high standards of quality, production and efficiency better than the best.

"The responsibility is upon us all and each one must during this next year and every year to follow, do his or her full share. Knowing well the spirit of our organization, I am not only willing but glad to let the future determine the real meaning of Mead Co-operation."

BUFFALO
BOILER FEED
PUMPS



Duplex Outside Center Packed for pressures up to 200 lbs.



Class "RDS" Multi-Stage for pressures up to 400 lbs.

Buffalo Boiler Feed Pumps can be furnished in either the Centrifugal or Reciprocating types. Let us know your requirements and our engineers will recommend the Pump best suited for your needs.

BUFFALO STEAM PUMP COMPANY
BUFFALO, N. Y.

"Buffalo"

SPRAY NOZZLES

are best to break up the foam on the wet end of paper machines. The spray is soft and uniform, and nozzles do not clog.

BUFFALO FORGE COMPANY
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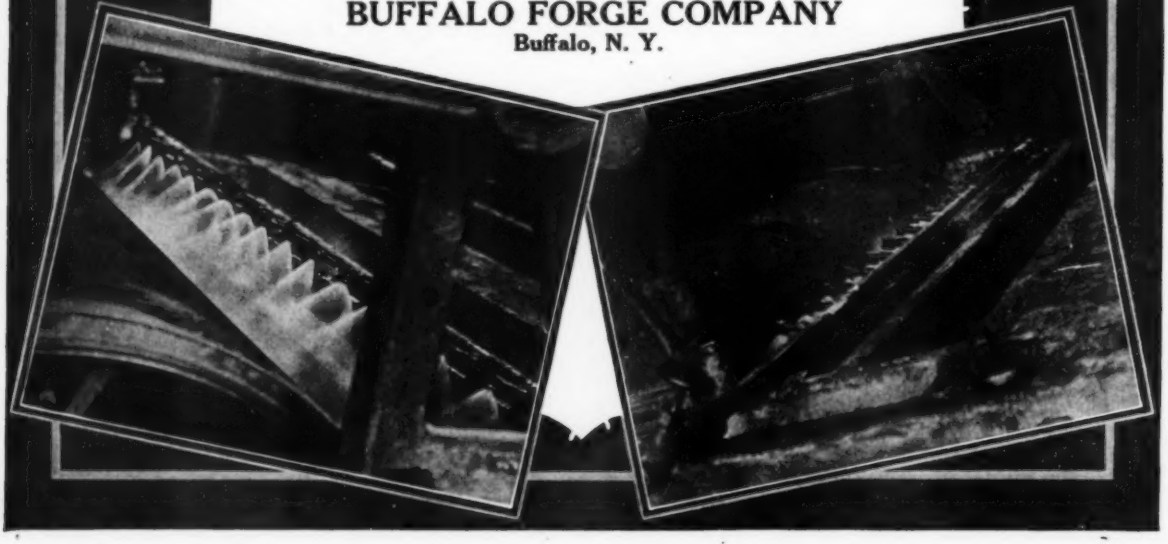

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Worth thinking about

Your piping is no less important than your Prime Mover and should be given the same thought and attention when you contemplate building your Power Plant.

Your piping in connection with Water-softening and Filtering Units—Evaporators, Conveyors and other machinery for Paper Mills are just as important. Each are essential for the efficient and economical operation of the plant.

Specify "Pittsburgh Piping" and you mention the best there is in Power Piping construction.

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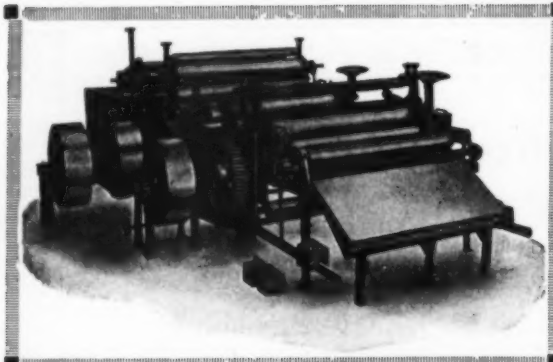

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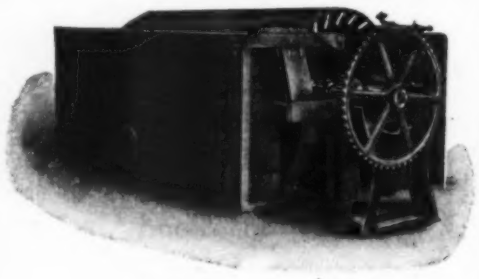
SINGLE AND DOUBLE PRESS
FOR CONVERTING CHEMICAL PULP INTO SHEETS 48% DRY

25-30 TONS air-dry pulp per 24 hours. Built in 72" width only, with patented pulp weakening and separating device or our new automatic knife cut-off attachment.

FREIGHT CHARGES are greatly reduced. Savings on this item alone often pay for the machine in one year.

110 Machines Now in Use. 28 Sold the Past Year



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Used as Pulp Thickeners, Savealls, Pulp Washers and Water Filters

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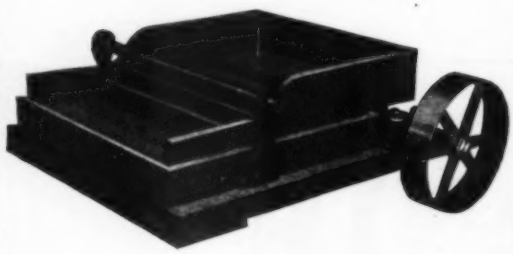

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Will bear closest investigation from every angle. It separates knots and slivers from all kinds of pulp efficiently, continuously, automatically with negligible cost for operation and upkeep. Simple but rigid construction. Only best materials used. Operation in plain view.

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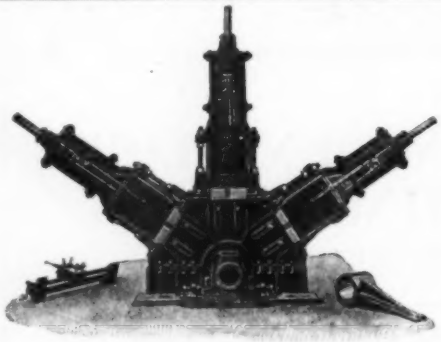

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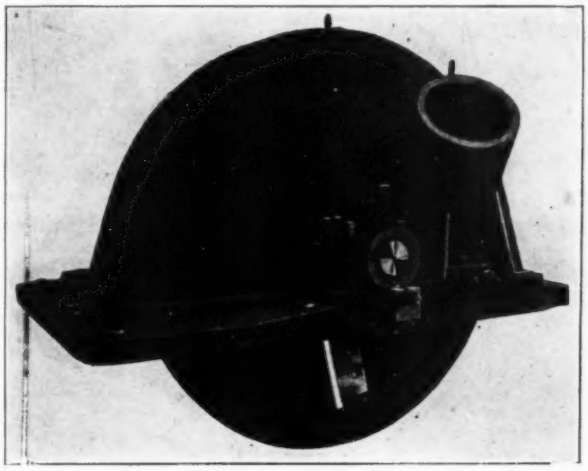

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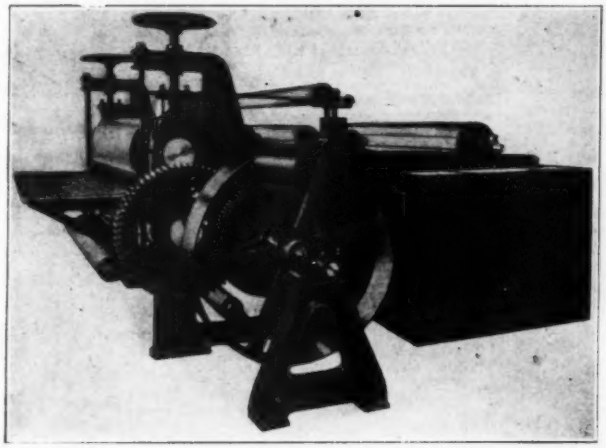

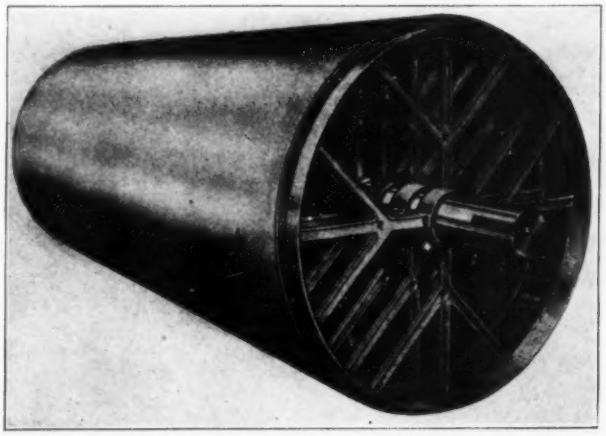

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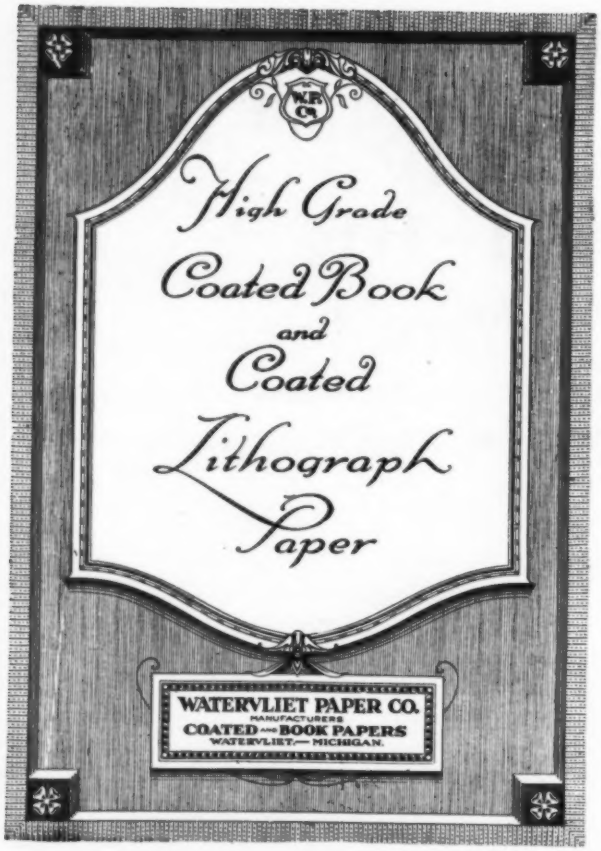

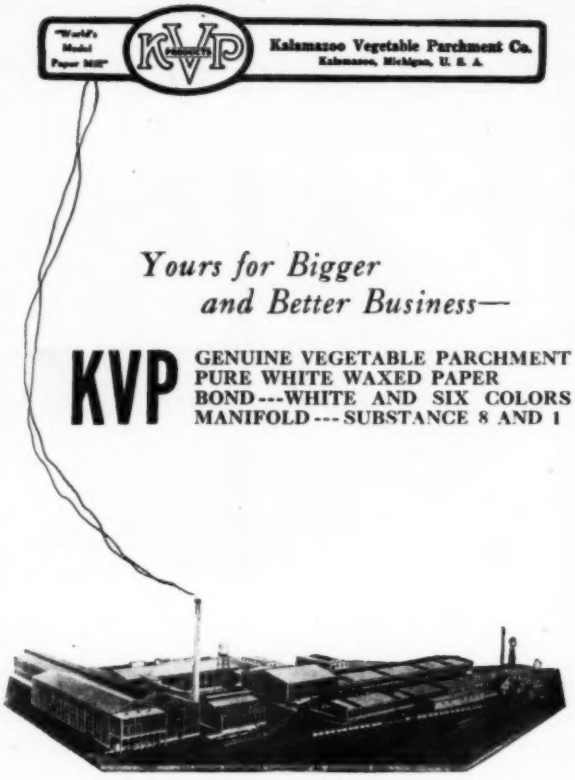

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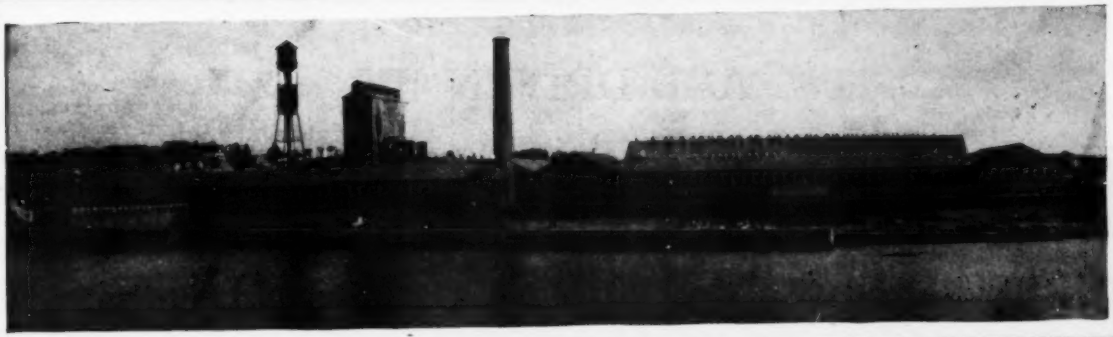

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Wet End of No. 8 and No. 9 Machines
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KENWOOD TAN JACKETS

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Being treated by a patented tanning process which makes them thicker, heavier, firmer and stronger, mills which observe just five simple precautions in their use are saving the price of several ordinary jackets with a SINGLE Kenwood TAN Jacket.

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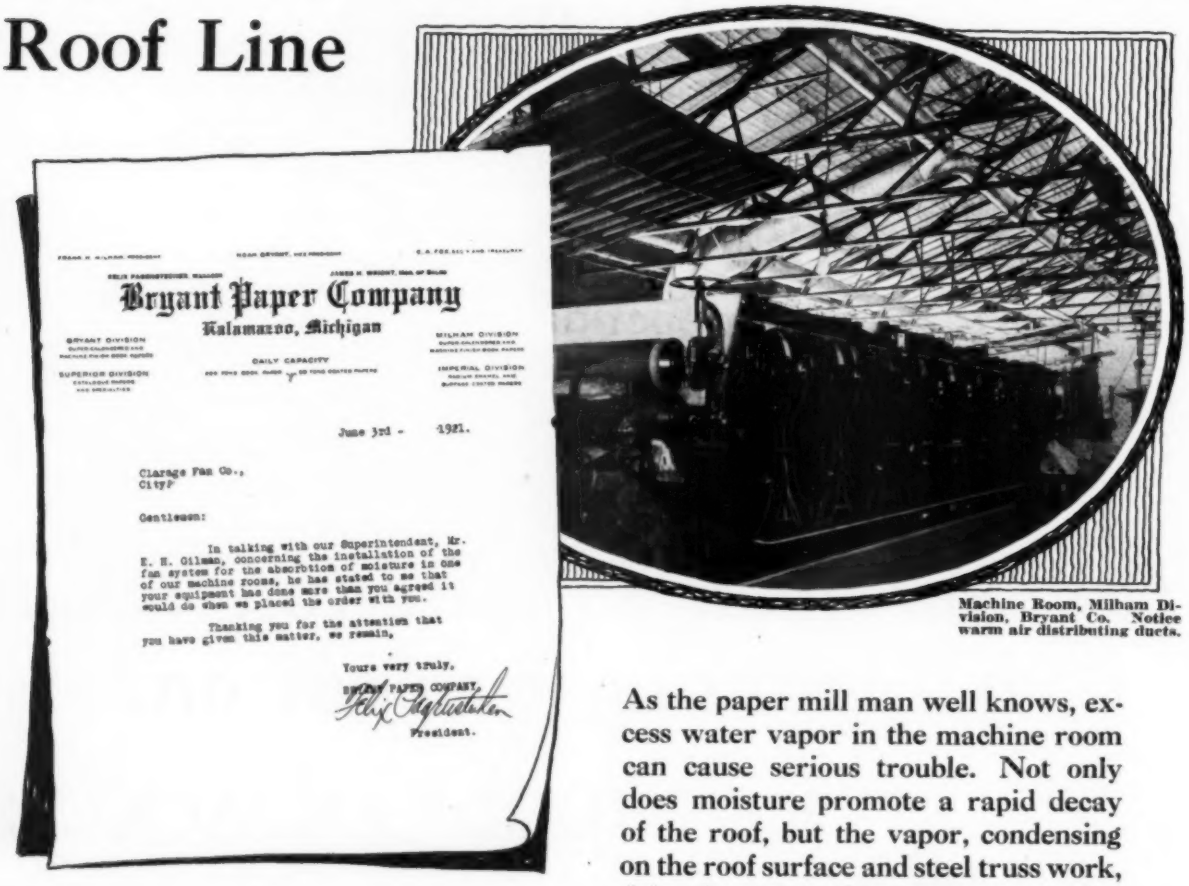

Bryant Paper Company
Kalamazoo, Michigan

June 3rd - 1921.

Clarage Fan Co.,
City

Gentlemen:

In talking with our Superintendent, Mr. E. H. Gilman, concerning the installation of the fan system for the absorbtion of moisture in one of our machine rooms, he has stated to me that your equipment has done more than you agreed it would do when we placed the order with you.

Thanking you for the attention that you have given this matter, we remain,

Yours very truly,

President.

Machine Room, Milham Division, Bryant Co. Notice warm air distributing ducts.

As the paper mill man well knows, excess water vapor in the machine room can cause serious trouble. Not only does moisture promote a rapid decay of the roof, but the vapor, condensing on the roof surface and steel truss work, drips down onto the new paper causing spots and frequent tearing with a consequent loss of production. The Bryant Paper Company solved their problem by installing a Clarage Roof Drying System.

We ask that you read the accompanying letter from the Bryant Company, as evidence that the Clarage Roof Drying System is giving results. They have recently purchased a duplicate system, which further proves they are satisfied. Have Clarage engineers co-operate with you in solving your problem. Write us today.

Clarage Fans and Blowers for Paper Mill Service

Aside from apparatus for roof drying, we manufacture fans and blowers for heating and ventilating, moisture absorption, conveying paper stock, mechanical draft and other purposes. Also small vertical steam engines. You will find that Clarage equipment operates with a minimum of attention and the necessity for repairs is the exception, not the rule.

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Manufacturers of Fans, Blowers, Heaters and Engines

Powdered Coal as Fuel in Steam Plants

By HENRY KREISINGER, Research Engineer, and JOHN BLIZARD,
Fuel Engineer, U. S. Bureau of Mines

Paper Read at the Annual Meeting of the Technical Section of the Canadian Pulp and Paper Association, Montreal, January 25 and 26, 1922

IT is now definitely established by experiment that a higher thermal efficiency can be obtained in steam plants by burning coal in powdered form than by burning it by any other method. It can be said also that in many steam plants, steam can be made more cheaply with powdered coal than when burning coal by any other method.

The reasons for the high thermal efficiency of powdered coal are as follows:

(1) Very nearly complete combustion can be obtained with small excess of air.

(2) Variation in load over a wide range can be readily followed, and at the same time furnace conditions giving high efficiency can be maintained continuously and easily.

(3) No coal need be burned on banked boilers during the low load periods.

It is apparent that the first two of the above conditions of high efficiency depend entirely on proper burner and furnace design. In other words, it is the furnace that makes high efficiency possible. No matter how cheaply or how easily powdered coal is prepared, if the coal cannot be burned efficiently, the plant is a failure. For this reason a large part of this paper is devoted to furnace design.

Very Nearly Complete Combustion with Low Excess of Air

Very nearly complete combustion with low excess of air is the first requisite of high thermal efficiency. Numerous tests show that with powdered coal, combustion complete within one per cent can be obtained with 20 per cent excess air. This one per cent of incomplete combustion includes both the gaseous combustible as CO in the flue gases, and the unburned carbon in the ashes.

Table 1 gives the averages of the principal results of three groups of tests made at Oneida Street Station of the Milwaukee Electric Railway and Light Company. The first vertical column gives the averages of a group of five tests made with dried coal; the second column gives the averages of three tests made with undried coal; and the third column the averages of two tests made with coarse coal. Each test lasted 24 hours. The tests were made on a three pass Edgemoor boiler rated at 468 boiler horsepower, and equipped with a Lopulco furnace designed by the Locomotive Pulverized Fuel Company. The furnace is shown in Figure 1. During this series of tests a thorough study was made of the combustion of pulverized coal and the proper design of furnaces for burning pulverized coal. Figure 2 shows a group of isothermal lines determined by measurements with platinum thermocouples. The highest temperature is shown to be a short distance above the shelf, where the combustion is most intense, due to violent mixing of the gases and particles of coal caused by the change in the direction of the flow, and where the flame thus

TABLE 1

SUMMARY OF RESULTS OF THREE GROUPS OF TESTS

ON A 468 B.H.P. EDGE MOOR BOILER BURNING POWDERED COAL

ONEIDA STREET POWER STATION

THE MILWAUKEE ELECTRIC RAILWAY AND LIGHT COMPANY.

	Dried	Undried	Coarse
1. Condition of coal			
2. Number of tests averaged	5	3	2
3. Average duration of tests, hours	23.26	21.16	24.36
4. Moisture in coal as burned, per cent	2.75	8.05	3.53
5. Coal through 200-mesh, per cent	71.3	70.8	64.7
6. Coal through 100-mesh, per cent	94.72	94.90	89.7
7. Rating, per cent	117.0	112.8	113.4
8. Carbon dioxide, per cent by volume	15.1	15.6	14.85
9. Oxygen, per cent by volume	3.5	3.2	3.85
10. Carbon monoxide, per cent by volume	0.02	0.0	0.05
11. Temperature of flue gases, deg. Fah.	484	488	478
12. Per cent of excess air	21	18	22
13. Incomplete combustion loss, per cent	0.8	0.3	0.8
14. Boiler efficiency based on gross calorific value of coal, per cent	82.2	80.8	82.2
15. Boiler efficiency based on net calorific value of coal, per cent	85.3	83.9	85.3

far in its path from the burner has been unable to radiate a large proportion of its heat to either the cooling coil beneath it or the lower row of tubes above it.

By referring to items 12 and 13, it will be seen that the excess of air averaged 21, 18 and 22 per cent, and the incomplete combustion loss averaged 0.8, 0.3 and 0.8 per cent for the three groups of tests. The overall thermal efficiency of the boiler was 82.2, 80.8 and 82.2 per cent based on gross heat value of coal, and 85.3, 83.9 and 85.3 per cent based on net heat value of coal.

Figure 3 shows graphically the results of another series of 26 tests made at the Lakeside Station of The Milwaukee Electric Railway and Light Company. All of these tests were made on the same four pass

Edgemoor boiler rated at 1,338 boiler horsepower and were of 24 hours duration. The results are plotted on the percentage of rating as abscissae. When two or more tests were made at nearly the same rating, the results were averaged and the averages were

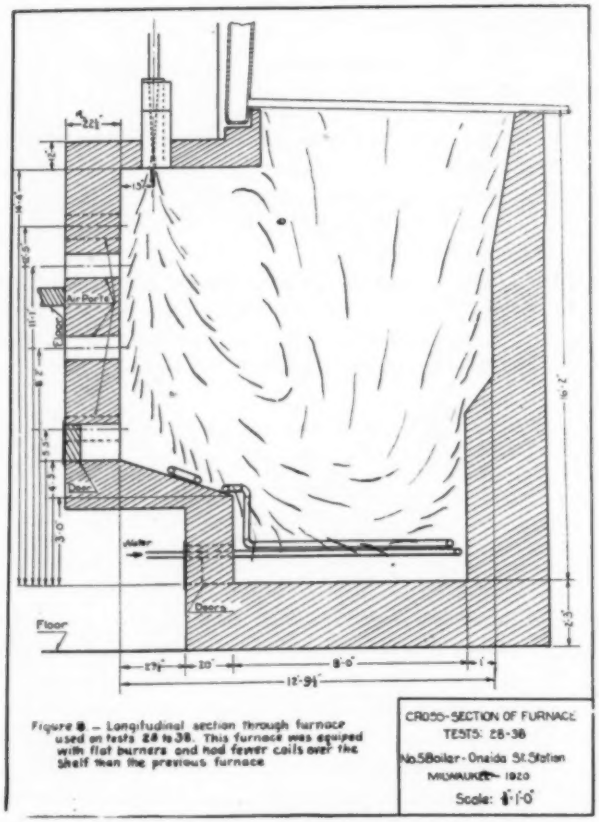

Figure 8 — Longitudinal section through furnace used on tests 28 to 36. This furnace was equiped with flat burners and had fewer coils over the shelf than the previous furnace

Fig. 1.—Section through furnace of the Oneida Street Station of the Milwaukee Electric Railway and Light Company. The tests, results of which are given in Table 1, were made with this furnace. The coils shown near the bottom is an experimental water screen from which the screen shown in Figure 4 was developed. This furnace was recently rebuilt on similar design of the furnace shown in Figure 4.

used in the plotting. This series of tests covers a range of from 135 to 255 per cent of the boiler's rated capacity. The highest efficiency was obtained at about 150 per cent of rated capacity. Even when the rating was increased to 255 per cent, an efficiency of 82 per cent was still obtained. This efficiency, shown by the lowest efficiency curve in Figure 3, is based on the gross calorific value. The curve above it shows the efficiency based on the net calorific value, and is seen to be about 3.5 per cent higher. The curve at the top shows the overall thermal efficiency of the boiler and economizer based on the net calorific value, which for practically all the tests was well over 90 per cent, a very high efficiency.

It will be noted in the two curves of Figure 3, giving the excess air and the incomplete combustion, that in this series of tests the excess air was as low as 5 per cent. The incomplete combustion heat loss did not exceed 2.4 per cent; it is plotted on the same scale as the thermal efficiency and is shown by comparison to be extremely small.

Complete combustion with low excess air is ordinarily accompanied by high furnace temperature, and high furnace temperature destroys the furnace lining, and causes the ash to fuse on the bottom of the furnace, whence it is difficult to remove.

We have then the following chain of reasoning:—

On account of the cost of preparation, powdered coal must be burned with high efficiency in order to compete successfully with other methods of burning coal. High efficiency is obtained by burning the coal completely with low excess of air. Low excess of air causes high furnace temperature which in turn is destructive to the furnace lining and makes removal of refuse difficult. Therefore, the success of pulver-

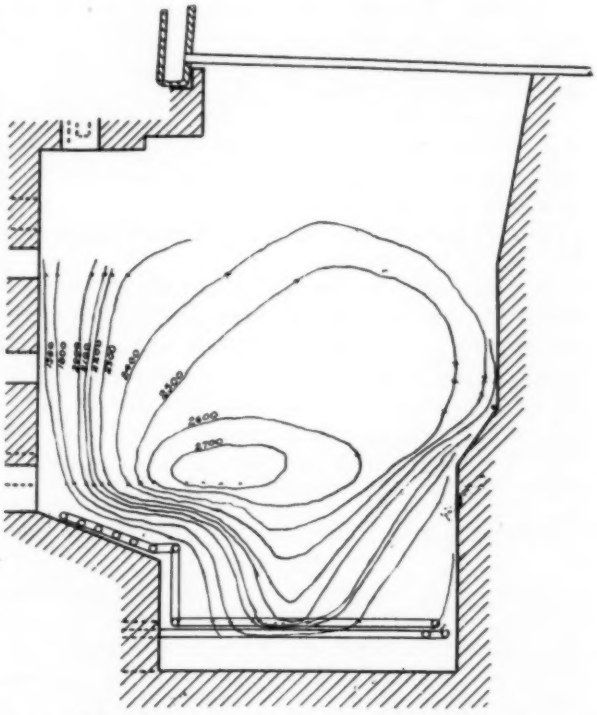

Fig. 2.—Isothermal lines in furnace shown in Figure 1. The temperatures were determined by platinum thermocouples. The highest temperature is shown to be a short distance above the shelf where the gases mix with air, where the combustion is most intense. This high intensity of combustion is due to violent mixing of the gases and particles of coal caused by the change of direction in their path of travel.

ized coal under steam boilers depends on the solution of these two problems:

(a) Prevention of the destruction of the furnace lining, and

(b) Easy removal of ash from the furnace.

The ash of most steam coal fuses and runs like molten iron at a temperature of 2,300 to 2,400 deg. F. When the temperature of the furnace lining exceeds that of the molten ash, the slag penetrates into the brick and washes it away. But if the temperature of

the furnace lining be kept below that of the running ash, the slag on falling on the surface of the furnace lining is cooled to the temperature of the lining and becomes very viscous paste. In this viscous state the ash does not penetrate into the brick and does not wash away, but forms a soft protective coating. To prevent this erosion of brick work by slag, the furnace lining must therefore be kept below the temperature of running ash.

If the ash is to be removed easily from the furnace the falling particles of the molten ash must be cooled and solidified before they reach the bottom of the furnace, and the bottom itself must be kept below the temperature at which the ash is sticky. Under such conditions the ash deposit is in granular form and can be removed easily.

Figure 4, which shows a furnace designed to operate on these principles, is the furnace of the Lakeside plant of The Milwaukee Electric Railway and Light Company, and the one on which the tests, the results of which are shown in Figure 3, were made. Its design was developed co-operatively by the Research Department of the Combustion Engineering Corporation, the Engineering Staff of The Milwaukee Electric Railway and Light Company and the U. S. Bureau of Mines.

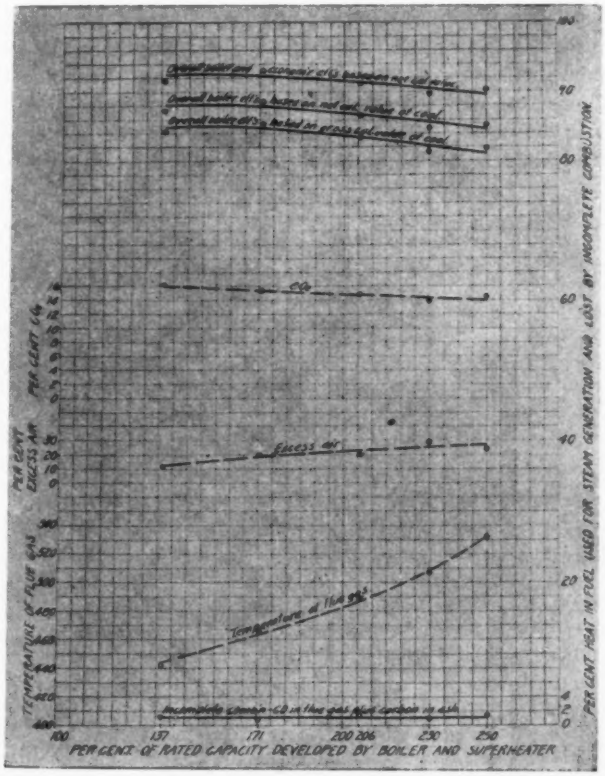
PER CENT EXCESS AIR
TEMPERATURE OF FLUE GAS
PER CENT HEAT IN COAL USED FOR STEAM GENERATION AND LOST BY INCOMPLETE COMBUSTION
CO
Excess air
Temperature of flue gas
Incomplete combustion - CO in flue gas and carbon in ash
100 137 171 200 206 230 250
PER CENT OF RATED CAPACITY DEVELOPED BY BOILER AND SUPERHEATER

Fig. 3.—Principal results of 26 tests made at the Lakeside Station of The Milwaukee Electric Railway and Light Company. These tests were made on the furnace and boiler shown in Figure 4.

The furnace lining is 9 inches thick and is separated from the outside walls by air spaces 9 inches wide. About 65 per cent of the air needed for combustion passes through these air spaces, absorbs heat from the furnace lining and thus keeps it below the temperature of the running slag. The air enters through the openings in the rear wall of the furnace.

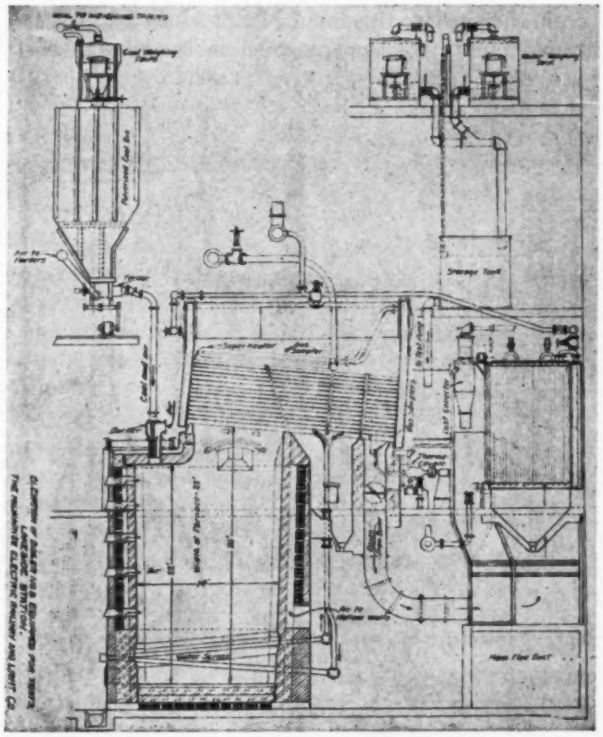

Fig. 4.—Boiler No. 8 of the Lakeside Station of the Milwaukee Electric Railway and Light Company. The boiler is shown equipped for tests the principal results of which are given in Figure 3. The furnace has a water screen connected to the boiler and hollow walls for supplying 65 per cent of the air used in combustion.

It passes through the air channels in the two side walls, meets in the passages of the front wall, and enters the furnace through the front wall air openings. The heat is taken by the air out of the furnace lining where it is not wanted, and is put into the combustion space where it is wanted. The air is heated while passing through the hollow walls to an average temperature of about 450 deg. Fahrenheit, and thus keeps the temperature of the furnace lining below that of the running slag, and prevents the erosion of the brick.

In addition to the benefits derived by cooling the furnace lining, the passage of air through the hollow walls greatly reduces the radiation losses by maintaining the outside surface of the furnace walls at a temperature not more than 15 deg. Fahrenheit above the temperature of the surrounding air.

The bottom of the furnace is kept cool by means of a water screen placed about three feet above the bottom. This screen consists of two rows of 4 inch tubes rolled into a common header in front. In the rear each row of tubes connects to a separate header placed at such an elevation that while both rows are

inclined relatively to each other, each row is inclined to the horizontal at the same angle as the tubes in the boiler are inclined. This slope gives the water in the tubes a positive circulation. Water comes down from the rear water leg of the boiler into the lower row of tubes, passes through it to the front header of the screen, then enters the upper row of tubes and passes through it into the upper header in the rear of the

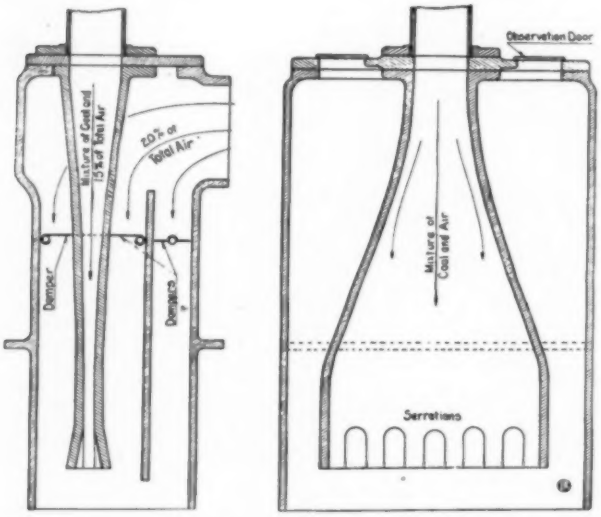

Fig. 5.—Burner of the latest design installed on the new furnaces of the Oneida Street Station.

furnace. From this header the water and steam rise into the boiler tubes over the fire and enter the front water leg of the boiler.

The water screen absorbs heat at the rate of 40,000 to 50,000 B. T. U. per square foot of heating surface per hour. In other words, it develops one boiler horsepower on less than a square foot of heating surface. The screens at the Lakeside plant have an effective heating surface of 300 square feet, and develop 400 boiler horsepower.

The effect of the screen in the furnace is threefold —(a) It absorbs from the flames by radiation an amount of heat equivalent to about 400 boiler horsepower, and therefore makes the furnace temperature considerably lower and helps to keep the temperature of the furnace lining below that of the running slag. (b) It cools and freezes the particles of the molten ash as they fall through it to the bottom of the furnace so that they are deposited in granular form. (c) It partly screens the bottom of the furnace from radiation from the flames, and also absorbs some heat from the bottom by radiation, thus keeping it below the temperature at which the ash is sticky. Thus it is possible with this design of furnace to maintain continually furnace conditions which give high efficiency.

Figure 5 shows the latest design of a burner for burning pulverized coal. This type of burner is installed in the Lakeside and Oneida Street Stations of The Milwaukee Electric Railway and Light Company. In these installations about 15 per cent of the air needed for combustion is supplied with the coal under a pressure of about 12 inches of water. About 15 to 20 per cent of the air is supplied through the burner around the nozzle, and 65 to 70 per cent through the hollow walls.

Variation in Load Can Be Readily Followed

With powdered coal the boiler operator easily controls the rate of combustion and air supply, and therefore the variation in the load over a wide range can be easily followed. The rate of combustion is directly proportional to the speed of the feeders and the coal burns as fast as it is fed to the furnace, which contains less than ten pounds of coal at any one time. About eighty per cent of the air needed for combustion is supplied by the draft in the furnace, and the quantity required is controlled by simply regulating the draft. Figure 6 shows graphically how nearly constant furnace conditions can be maintained with a variable load. The figure gives the principal observations on a nine-day test made with two Stirling boilers burning powdered coal, at the plant of the St. Joseph Lead Company, Rivermines, Missouri. The tests were made under the actual operating load conditions. The regulation of the coal feed and the furnace draft was done by the regular plant fireman. There was also a battery of Heine boilers equipped with chain grate stokers in this plant. These stoker fired boilers carried a steady load while the two pow-

TABLE 2.

SUMMARY OF RESULTS OF A NINE-DAY TEST
ON TWO 768 B.H.P. STIRLINGS AT THE PLANT OF
THE ST. JOSEPH LEAD COMPANY,
RIVERMINES, MO.

	First 5 days of test	Last 4 days of test
1. Condition of coal	Dried	Undried
2. Average rating, per cent	155	156
3. Temperature of flue gases, deg. Fah.	562	567
4. Temperature of superheated steam, deg. Fah.	535	536
5. Per cent of carbon dioxide in flue gases	13.7	13.6
6. Per cent of excess air	32	32
7. Incomplete combustion loss, per cent	1.0	1.3
8. Boiler efficiency based on gross calorific value of coal, per cent	78.8	78.7
9. Boiler efficiency based on net calorific value of coal, per cent	81.9	81.8

dered coal Stirling boilers took the variation. The furnaces of the Stirling boilers are of somewhat older design and not having the water screen cannot be operated with as low excess air as the furnace shown in Figure 4. Nevertheless the efficiency was good. Table 2 gives the average of the principal results of the entire tests. The efficiency is expressed in two ways, one based on the high or gross heat value of the coal and the other on the low or net heat value. The efficiency of this test is the ratio of the heat

absorbed by the boiler divided by the heat in the coal delivered to the feeders.

No Coal Need Be Burned on Banked Boilers

Powdered coal ignites with the same ease as gas. Therefore, fires under a banked boiler can be started and the boiler brought up to full operating conditions usually in less than ten minutes, which makes it unnecessary to burn any coal while boilers are banked. Thus powdered coal offers a possibility of considerable saving in plants where boilers have to be kept in a banked condition over long periods.

Power and Coal Required to Prepare Pulverized Coal

In the present state of the art of preparation of pulverized coal, the power required to pulverize coal is about 14.5 kw. hours per ton when the coal is dried. This figure includes the power used to convey the coal from the pulverizing mill to the feeder bins. When the coal is dried in a dryer, the power required to operate the dryer is about 1.7 kw. hours per ton. In addition to this, about 1¼ per cent of the coal dried is burned to heat the dryer. If the coal does not contain too much surface moisture, it can be successfully pulverized without previously drying it, and the power required to pulverize the coal is about equal to the sum of the power needed to operate the dryer and the pulverizing mill with dried coal, or about 16.2 kw. hours per ton, but the coal that would be used in the drying process is saved.

In the past there has been a tendency to emphasize the necessity of drying the coal to a very low precentage of moisture and to pulverize it very finely. This necessity has been largely due to improper furnace and burner design and the inability of such furnaces to burn undried and coarsely pulverized coal.

Recently, however, with some coals the process of drying is being eliminated, and the coal is not pulverized so fine as was thought necessary in the past. This tendency, which has been made possible by better furnace and burner design, is reducing the cost of preparation of powdered coal.

In this connection attention is again called to the results of tests given in Table 1. The second vertical column gives the average of three tests made with undried coal, and the third column the average of the results of the two tests with coarse coal. These two groups of tests show that as complete combustion was obtained with as low excess air with the coarse coal and the undried coal, as with the dried and more finely pulverized coal of the first group of tests.

It is the belief of the authors of this paper that the near future will see a greater reduction in the cost of preparation due to both the improvement in the pulverizing machinery and to the ability of furnaces to burn coarse and undried coal. The reduction in the cost of preparation will stimulate the use of powdered coal.

It may be pointed out in conclusion that the higher the price paid for coal and the lower the costs of electricity, the greater are the advantages to be derived from pulverizing coal before burning it. Pulp and paper manufacturers, situated as they commonly are, far from coal mines and near to water power, may therefore hope to derive more benefit for burning powdered coal than they who generate steam with cheaper coal, but whose electric power for preparing the coal costs considerably more.

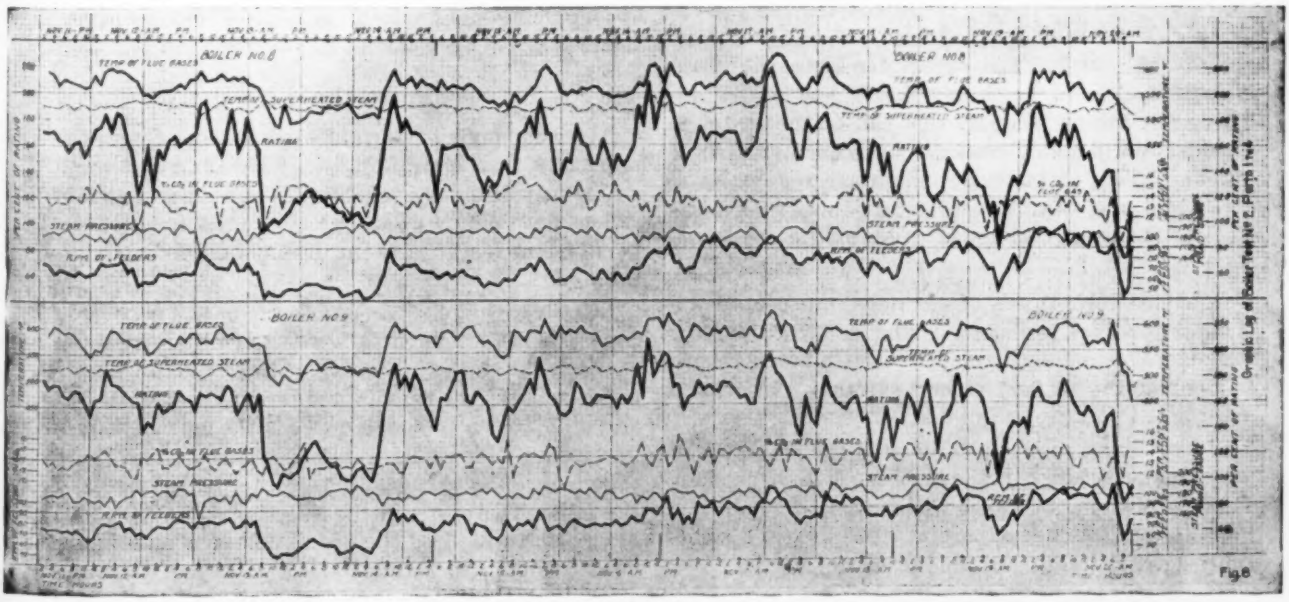
BOILER NO 8
BOILER NO 9
TEMP OF FLUE GASES
TEMP OF SUPERHEATED STEAM
RATIO
STEAM PRESSURE
Graphic Log of Boiler Test No 2, Plants 1 to 6

Fig. 6.—Graphic log of principal data of a nine-day test on two Stirling boilers burning pulverized coal at the plant of the St. Joseph Lead Company, Rivermines, Mo. The chart shows how variation in load can be easily followed with good furnace conditions.

Human Factor and System in Paper Making

By K. H. COUGHLIN

WE GIVE full credit to the inventors and builders of machines which have made the progress of the paper industry so wonderful during the past ten years, and we predict that this progress will continue and be greater than ever, when the paper maker through his associations will co-operate with the builders of machinery.

The wide fast machines will do much toward reducing the cost of making paper, but the greatest economizer in future paper making will come from proper attention to the paper makers, and the systems under which they work.

When the writer began his career as a papermaker, he found two others besides himself employed to operate the 72" machine upon which he worked. One of these was a man about forty years of age, who was the machine tender. The other fellow was about twenty-eight years old and had been a back tender for three years. The machine crew was complete with myself as third hand.

Book paper of a good quality was made and strict attention, by all in that mill, to the work in hand, was very noticeable. A spirit seemed to urge every man to have a personal interest in the product made.

There was no boss machine tender. The machine tender was responsible equally with the beater engineer for color, strength and quality of paper. If one doubted any of these qualities, he would confer with the other and in case doubt still existed the old Super's attention was called for. Most of the present day mill owners and superintendents originated from this class of machine tenders and beater engineers, and this is the fact that caused the writer to consider the human element as an economical factor in reducing the cost of paper manufacture.

Investigation into the methods of operating paper mills in these modern times, discloses the following facts.

In at least two-thirds of our mills, prospective applicants for work are hired by the superintendent or foreman of some department, without much regard to their ability or past record. If they look strong and rugged they are acceptable.

Strength and ruggedness alone in the operation of paper manufacture can and does cause immense loss. These two when not linked with character, ambition, honesty and intelligence are of little use, and sometimes detrimental to desirable results.

A strong, slow thinking and careless man will cause hundreds of dollars' worth of damage in a short period of time, if he is allowed to push a two wheeled truck in the vicinity of roll paper in storage.

Pages could be written about the different types of men and women we find employed in paper mills, and how their work affects the product, its cost and quality. We will leave the reader to think this over and if sufficiently interested to investigate this subject, and check up his employes, to see if they are filling each position as it should be filled. We know he will find costly misfits in more than one department.

Remedy

You do not need to engage an employment manager. When a position is vacant in any department, tell the foreman of that department you wish to talk with him before anyone is hired. Then get down to brass tacks and find out just what kind of a man you need to do that job, as it should be done.

Buy Blackford's books on "Character Reading at Sight" and know how to size a man up before he speaks.

Get his past record and verify it by getting in touch with his previous employers. Find out his ambitions and if you engage him, look him up once in a while, and learn if he is what you thought he was.

There is no room for an employment manager in a small plant. This position must be filled by the superintendent of the plant, and he must know the job of employing labor as well as he does making paper, for it is of equal importance.

Training the Labor

After employing the right kind of labor comes the important task of training it. There is a right and wrong way of doing everything. The superintendent cannot be "Johnny on the spot" every minute of the twenty-four hour operation; he must depend upon his foreman.

I consider the selection of a foreman of a paper mill department more important than any other one thing connected with the business. for he is a man who can make or break the smooth and profitable operation of any mill. Upon this man depends the efficiency, productivity and morale of his department, and these things mean a great deal to the other departments of the mill. Therefore, in the selection of a foreman, I have always favored the promotion of a man in the department, rather than taking in a man from another mill, regardless of his reputation, for I believe the loyalty and earnest work of old employes should

be recognized and that they can be developed into the proper type of foreman, if the superintendent gives them the teaching and support he should.

Having a dependable foreman over each department, removes over fifty per cent of the difficulties of paper manufacture.

To make them dependable, you must use a cost system that will produce facts and figures that will enable them to control the operations of their departments. This is best done by means of monthly meetings at which every foreman attends and with pad and pencil jots down the story of the monthly operation of his department. Comparisons of previous months are made and general discussion by all present is bound to bring out valuable points, impossible to secure in any other manner.

The master mechanic is told by the foreman of some other department that the production of his department was interfered with, by failure of the mechanical department to make necessary repairs. The matter is talked out until a remedy is found, and so it goes with the relations of one department to another, and many a tough problem is solved.

No better method of dealing with difficulties in the paper industry can be imagined, and it should be utilized by all mills.

The cost system is a subject upon which much has been written by the cost accountant, but the practical man has not had much to say about it, and I am sure his view point would be interesting.

The Machine Tender

Probably the most important man in the mill, next to the foreman is the machine tender, or rather in these modern times the boss machine tender. In the old days it was the machine tender who shouldered the responsibility of the machine's output in quantity and quality, but today the responsibility is put onto the boss machine tender.

In the great majority of mills, the method works as follows:

A customer has put in a complaint on a lot of paper shipped to him. Of course, the first man to get hit with the complaint is the superintendent, and that worthy with blood in his eyes, feverishly looks over the production books until he finds the machine and time on which the paper was made, and then instead of sitting on the machine tender's neck he sprawls all over the boss machine tender, who was in charge of the shift upon which the paper was made. In turn, the boss machine tender gets cross with the man who actually made the paper.

Now suppose the boss machine tender was eliminated, what would happen? Better machine tenders for one thing. They would necessarily have to be, for they would have no boss machine tender to shoulder their responsibility, and would have to deal direct with the superintendent, which I am sure would not be a disadvantage.

Can two men successfully run a machine on the same shift? Not as successfully as one good man.

Successful operation of a paper machine means proper conditions of stock in the first place, adjustment of various sections of the machine to meet stock conditions, control and management of water, steam, suction, etc., and cannot be accomplished successfully when two men are operating these various things; therefore, I contend that one good machine tender is worth more than a good boss machine tender and a medium machine tender.

Some readers will probably disagree with this statement, and contend that a boss machine tender is necessary, in a mill having three, four or more large machines; I agree that he is, when the machine tenders operating those machines have been brought up to run a machine in a mill where a boss machine tender was in charge.

But, I disagree, when the machine tenders of the old days, are considered, for they were men who knew when a machine needed a wash up or new felt. They also knew when the paper was not right in color or quality, and their greatest desire was to leave the machine in perfect shape for his mate, and the mate reciprocated.

I have often seen this kind of a machine tender stay an hour after quitting time, in order that some difficulty on the machine would be straightened out satisfactorily.

For example, in those days a change of shifts would take place like this:

Bill, the machine tender, would come walking down the machine room with a fine smile on his face, for all was tight and fit. No sign of broke around and a full reel up without a break in it. His mate, Jerry, just lifting his face out of a stream from the hose, would see him and wave a good fellow greeting. And then the "Gab."

"Well Jerry," says Bill, "how did the old gal go today?"

"Fine as silk, Bill," replied Jerry. "I gave her a good wash up and put on a second felt, before getting on this order and everything is ship shape and solid for a good night's run. She is pulling exactly eight hundred per hour, and there is enough of the order to run you 'til I come in in the morning."

"Fine," says Bill. "If I have good luck, I think I'll worm that spare felt roll and monkey around that second press lever, that's been sticking a bit lately."

And so they talk for probably fifteen minutes, and the production and quality of that machine is taken care of by the best in the business.

Now to describe a change of shift in these days of paper making.

Jimmy comes on shift at eight A. M., four or twelve P. M., and greets Joe who is all skick and span and on the mark ready to dash out.

"Hi Joe, D'ja see what Babe did to the ball yester-

day. Some Babe, hey? I bet cha five berries that the Giants win the rag. What cha say?"

"Aw," says Joe. "Nothin' doin' until pay day and then I'll risk a few iron men on the Pirates."

After talking baseball, fight and prohibition Jerry says, "Have I got a straight run?"

Joe answers, "I donno, I see the boss figuring up a little while ago, but he didn't say anything."

"How much you making?"

"I dunno, he told me to put her up to 250 and I didn't figure her up."

"Runnin' good?"

"Fair. Had three wet breaks in the reel up, and I think the first felt is fillin' up, but the boss said to let her slide."

Out goes Joe and on goes Jerry, but he is simply assistant to the boss machine tender. And Jerry's boss machine tender comes along and looks at the sheet Jerry is making and Jerry stands expectantly by, waiting for the orders he expects will come, and all during his shift he does not do but little of what he would do if the boss machine tender was not on the job.

But the real mistakes are made when the paper begins to break. Three or four breaks brings the boss machine tender to the rescue and probably the machine tender has just made some change in the suction, water, etc. The boss machine tender makes more and the old machine runs wild before things are straightened out.

I am not making a plea to eliminate boss machine tenders, but I wish to emphasize the necssity of doing something to increase the ability of the machine tenders of today. For I know by experience they are not as competent as they have been in the past, and some system of making full fledged machine tenders must be planned if best results are to be attained.

This applies to other departments of the mill as well as machines, but is more important, as the machines are the producers that make all parts of the mill hustle or wait.

The condition of the paper industry at this time urges us all to do our best to meet the demand for lower prices. Shut downs, and wage cuts are not the remedy.

System, production and strict attention to every detail will do a great deal towards getting back to normal.

The past four years have produced a number of things in industry that do not seem able to survive, the most common of these is the irresponsible worker and the quicker he is eliminated the better off will be the industrial world. So let us give some thought to the old days of paper-making and add to the speed of production today the principle of those times.

Effect of Bleaching on Fibers

By E. SUTERMEISTER

IN a previous paper on the "Principles and Practice of Bleaching" the subject was discussed almost entirely from the point of view of the efficiency of bleaching, under various conditions, with solutions of calcium hypochlorite. The present paper takes up the effects of bleaching on the physical and chemical properties of the fiber produced and includes a brief discussion of bleaching with potassium permanganate. All of the factors taken up have an important bearing on the cost, use or permanence of the fiber produced.

Loss in Weight on Bleaching

In any method of bleaching and washing fibers there is some loss due to the type of equipment used and the method of handling the stock; this may be said to be a mechanical loss. In addition to this there is a loss in weight caused by the chemical action of the bleaching agents, principally their oxidizing and solvent action upon the impurities present as well as upon the cellulose itself. The mechanical loss can never be completely eliminated but it may be minimized by the selection of proper equipment and by eternal vigilance to see that no unnecessary leaks occur. The loss due to chemical action depends upon the kind of fiber, the bleaching agent used, and upon a number of other factors, a knowledge of which makes it possible to understand bleaching operations much more clearly.

As a general rule it may be said that the more bleach the fiber requires the greater will be the loss in weight. This is well illustrated by the following figures taken from tests made on a number of sulphites which were on the market before the war:

Kind	Percent bleach required	Percent loss on bleaching
Swartvik, 2 Crowns	5.0	0.8
T Prima	6.8	1.1
Swartvik, 3 Crowns	7.6	1.2
Burgess	9.3	1.8
Dominion	11.0	2.4
Katahdin	12.0	2.6
Orono	16.2	3.1
Odell	19.8	3.5
Berlin Mills	22.5	5.2

This rule applies also to different lots of the same kind of fiber which have been cooked in such a way as to require different amounts of bleach in order to give the same color. Five different lots of the same

kind of imported sulphite, for instance, gave the following results, both being expressed as percentages based on the original fiber:

Bleach required	Loss on bleaching
7.4	1.4
9.6	2.1
9.7	2.2
10.8	2.3
11.5	3.3

While this rule is of general application it is true that there are many exceptions to it because of the influence of other conditions which affect the results.

With any given fiber it holds true that the more bleach it is allowed to use up the greater loss in weight it will suffer. This is very well illustrated by the following figures taken from experiments in which excessive amounts of bleach were allowed to react with the fiber until all the bleach was exhausted:

Fiber	Bleach used percent	Loss on bleaching percent
Sulphite No. 1	13	2.27
Sulphite No. 1	22	3.51
Sulphite No. 1	32	5.06
Sulphite No. 2	5	1.66
Sulphite No. 2	15	3.59
Sulphite No. 2	25	5.72
Soda poplar	11.5	1.94
Soda poplar	20.5	3.69
Soda poplar	30.5	8.03

The presence of soluble substances in the fiber, which would be removed by more complete washing or by the use of purer water, may have a very considerable influence. Sulphite fibers may contain more or less calcium sulphate or sulphite because of unsatisfactory cooking conditions and these would be dissolved during bleaching and washing. Occasionally the water used for washing the waste liquor out of the fiber contains soluble material which remains with the fiber and is later washed out and lost. An extreme case of this sort was that of a sulphite fiber which was washed by means of sea water. The salt from this source amounted to 6.5 percent of the dry pulp and while this was paid for at the price of fiber it was completely lost during the bleaching operations and the subsequent washing.

The nature of the cooking process seems to have an influence on the loss on bleaching to judge from the following tests:

Fiber	Bleach required	Loss on bleaching
Sulphite, 120 R. K.	11.7%	2.4%
Sulphite D. P.	13.0%	2.3%
Soda Poplar	11.5%	1.9%
Sulphate No. 150	13.2%	1.1%
Sulphate W. W. L.	13.3%	0.7%

It would appear from these few experiments that for an equal bleach consumption, soda or sulphate fiber loses less in weight than does sulphite. This is probably due to the removal by the alkaline cooking treatment of the soda and sulphate process, of substances which are not dissolved by the acid treatment of the sulphite process, but remain in the fiber to be removed later by the alkaline oxidation of the bleaching bath.

Considering the bleaching with hypochlorites the temperature at which the action takes place has a certain influence. Experiments by the writer on three different pulps showed that when the bleach added was all used up by the fiber the loss in weight decreased with rising temperature. The figures for these tests follow:

Fiber	Percent bleach	Percent weight lost on bleaching at 68°F	104°F	158°F
Sulphite No. 1	13.0	2.31	2.27	1.97
Sulphite No. 2	5.0	1.89	1.66	1.11
Soda poplar	11.5	1.89	1.94	1.64

These results seem very reasonable when it is remembered that at high temperatures bleach solutions tend to break down with the formation of chlorate, thus leaving less active chlorine to attack the fiber. Spence, on the other hand, working with soda poplar fiber finds that the loss increases with the temperature as follows:

Temperature of bleaching	Loss in weight
118°-120°F	2.50%
128°-130°F	2.58%
143°-145°F	2.78%

The balance of evidence seems to point to decreased loss in weight with higher temperatures but the point cannot be considered as settled beyond dispute and many more determinations should be made on a variety of fibers in order to prove the rule conclusively.

When an excess of bleach is added to the pulp and the excess removed by washing at the end of a definite period it would naturally be expected that higher temperatures would cause more loss in weight because more bleach is used up under these conditions. Simonsen finds this to be actually the case, the loss in weight being 6.1 percent at 30°C and only 4.5 percent at 20°C.

It is quite probable that the degree of alkalinity of the bleach solution used would also have an influence on the loss during bleaching, although little or no information seems to have been published on this point. Going to the other extreme it is stated by Schwalbe that acid bleaching attacks the fiber more than an alkaline treatment. Here again very little evidence appears to be available and it seems desirable that this whole question of the influence of the alkalinity or acidity of the bleach solution upon the loss suffered by the fiber should be much more carefully investigated.

Bleaching with Permanganate

Permanganates are strong oxidizing agents and may be used to destroy the coloring matters present in fibers. If a small amount of a solution of potas-

sium permanganate is added to unbleached fiber, its own pink color quickly disappears and the fiber is stained brown by the manganese dioxide which is formed. Further addition of permanganate causes a deepening of the brown color until a point is reached when the pink color of the solution added persists for some time, indicating that the easily oxidizable coloring matters in the fiber have been destroyed. If now sulphur dioxide or an acid sulphite is added the manganese dioxide is quickly dissolved and the fiber comes out beautifully white. The oxidation may be carried out in either acid or alkaline solution but if enough acid is present to prevent the precipitation of the manganese dioxide the fiber itself is very seriously attacked. Because of the high cost of permanganate this method of bleaching is not of very great interest commercially, but as it seems to have a more selective effect than hypochlorites the results of its use are of considerable scientific interest and it is not beyond the realms of possibility that it might find practical application in the production of bleached fiber for special purposes.

The rapidity of permanganate bleaching is vastly greater than that with hypochlorites, but its efficiency under all conditions has not yet been worked out with sufficient care. Beadle and Stevens claim that one pound of oxygen from permanganate is equal to five and one-half pounds of oxygen from bleaching powder when reckoned from the available chlorine equivalent of ordinary bleaching powder. From other work on rag stock Beadle finds that one pound of permanganate will do the work of 10 pounds of bleaching powder, from which he concludes that the oxygen in the two substances acts quite differently. This point has been investigated by the writer using two different samples of sulphite fiber and one of soda fiber. Each sample was bleached first to a satisfactory color with a solution of ordinary bleaching powder and then a second sample was bleached with potassium permanganate until the same color was produced. The results of these tests follow:

Fiber used	Percent of 35% bleaching powder used	Loss on bleaching percent	Permanganate used percent	Loss on bleaching percent
Sulphite No. 1	13	2.27	7	3.38
Sulphite No. 2	5	1.66	2.7	2.77
Soda poplar	11.5	1.94	6.2	2.35

According to these tests it appears that from 1.852 to 1.857 lbs. of 35 percent bleaching powder can be replaced by 1 lb. of potassium permanganate while from the oxygen evolved 1 lb. of the latter should equal 1.93 lbs. of bleach. From these tests it appears that, in the case of chemical wood pulps at least, the oxygen evolved by the two substances has the same bleaching power.

One of the most interesting things about permanganate bleaching is that it attacks the coloring matters and impurities of the fiber very rapidly but the cellulose itself quite slowly. While this selective action does not result in a lower loss in weight on bleaching, it does give a fiber which is less modified than that which has been bleached with bleaching powder. This point will be taken up later in discussing the chemical properties of the bleached fibers.

Effect of Bleaching on Strength

It is evident that if a bleaching process so affects the strength of the fiber that the paper made from it is weak and tender then that process must be abandoned or modified. It is therefore desirable to learn just how much the strength of the fiber is altered by bleaching under different conditions.

In investigating this question the experiments were carried out with the same three fibers already mentioned in connection with bleaching with permanganate. Each of these was bleached to a satisfacory commercial color and a second sample was then bleached to a much whiter color using 9 to 10 percent of bleach in excess of that used in the first bleaching. A third sample of two of the fibers was bleached with the same amount of bleach used in the first test and the operation finished by treating with 5.4 percent potassium permanganate.

From each of the bleached fibers, as well as from the unbleached portion, two lots were weighed out. One of these was made into hand mould sheets and air dried. The other was beaten with a constant amount of water, in a pebble mill for one hour and then made into hand mould sheets as before. After allowing sufficient time for the sheets to dry and come to constant conditions, they were tested for folding strength by means of the Schopper folding tester and for bursting strength by means of the Ashcroft tester. The results are as follows:

	Bursting strength		Folding Test	
	Unbeaten	Beaten	Unbeaten	beaten
Sulphite No. 1				
Unbleached	3.6	18.3	0.0	1.9
13% bleach	16.9	35.2	1.8	15.8
22% bleach	10.6	30.9	0.1	11.9
13% bleach 5.4% $KMnO_4$.	12.9	33.0	0.5	12.2
Sulphite No. 2				
Unbleached	4.9	21.1	0.0	2.9
5% bleach	18.0	34.0	2.3	15.0
15% bleach	10.6	32.4	0.0	4.4
Soda Poplar				
Unbleached	3.7	21.3	0.0	1.5
11.5% bleach	5.8	20.2	0.0	0.0
20.5% bleach	6.4	9.2	0.0	0.0
11.5% bleach 5.4% $KMnO_4$.	6.0	21.5	1.1	0.9

From these experiments it appears that bleaching increases the strength of sulphite fiber even when the color produced is much whiter than that usually accepted by the trade as satisfactory. While the very white fibers are stronger than the unbleached,

it is seen that over-bleaching tends to lower the strength from the maximum reached by the normally bleached material. This is particularly true with respect to the folding test.

With soda fiber there seems to be a decrease in strength as bleaching proceeds, if judgment is based on the beaten fibers, while the unbeaten fibers show an increase in strength. This quite probably indicates that soda poplar after bleaching is in such a plastic condition that the unbeaten fibers tend to cohere to a certain extent, but that they have been so changed that beating causes them to disintegrate much more than usual.

It is interesting to note the superior strength of the fibers bleached in part by permanganate. While the colors of these samples are better than those bleached with an excessive amount of bleach, it is true in practically every case that their folding and bursting strengths are also better. This appears to be a further proof of the selective action of the permanganate bleach.

These results are quite opposed to those found by Frohberg in his beating and bleaching tests on a considerable number of sulphite fibers. He found the bleached stock to be much weaker than the unbleached, the decrease in folding strength amounting to 30 to 63 percent and in breaking length from 7 to 12 percent of the strength of the unbleached stock. There seems to be no reasonable explanation of these differences as a careful review of his original publication indicates that the work was done with care and the results should be as reliable as those of the writer. More work along this line would appear to be very desirable.

Effect of Bleaching on Chemical Properties of Fibers

There are two chief ways in which fibers may be affected chemically by bleaching—they may take up chlorine with the formation of chlorinated products, or they may be changed to modified forms such as hydro-cellulose or oxycellulose.

It was formerly supposed that considerable quantities of chlorinated cellulose were present in bleached pulps, but it has been more recently shown by Schwalbe that bleached chemical pulps prepared in a number of different ways contained only 0.051 to 0.114 percent of chlorine and that much the greater part of this was combined with the mineral constituents composing the ash of the fibers. He has concluded that no appreciable chlorination takes place during bleaching and that the products of bleaching are quite completely removed during washing. Considering the very small amounts of chlorine which did remain in the bleached fiber he finds that sodium hypochlorite gives less than calcium hypochlorite and that slightly more chlorination takes place in alkaline than in acid solution.

The formation of oxycellulose takes place to a greater or less extent in bleaching with any oxidizing agent and the amount formed depends on the severity of the bleaching, the nature of the bleaching agent, the kind of fiber employed and quite probably on several other factors as the degree of alkalinity or acidity of the bleaching solution, the temperature of bleaching, etc. Hydrocellulose is probably not formed to so great an extent as oxycellulose, yet it may be formed quite largely at times and is probably never entirely absent. There is no satisfactory method for estimating the proportions of these two substances when they are present together and the best that can be done is to determine the amounts of both together. Even the methods by which this can be done are not all that might be desired and they probably give comparative rather than absolute results.

Of the methods which have been used in such studies Schwalbe's copper number method shows the grams of copper reduced by 100 grams of absolutely dry fiber when it is boiled in Fehling's solution under carefuly regulated conditions; the greater the amount of copper reduced the higher the percentage of oxycellulose. The loss in weight suffered by the bleached fiber when it is boiled in caustic soda solution is also a measure of the oxycellulose formation, since oxycellulose is far more soluble than normal cellulose. The latter test may be modified by determining the caustic soda which is neutralized or consumed instead of the loss in weight of the fiber. All of these tests must be made under standard and carefully regulated conditions if comparable results are to be expected, and wherever possible they should be made on a sample of the unbleached fiber in order to get a basis for comparison.

Tests made by these three methods on the bleached fiber from the same sulphite and soda pulps already mentioned gave the following results:

	Copper number	Loss in weight on boiling with NaOH Percent	NaOH Consumed Percent
Sulphite No. 1			
Unbleached ...	2.56	11.5	10.0
13% bleach...	2.81	10.9	11.4
22% bleach...	3.51	14.2	12.9
32% bleach...	7.13	21.7	19.2
Sulphite No. 2			
Unbleached ...	3.18	13.0	10.7
5% bleach....	2.36	10.2	10.8
15% bleach...	4.99	17.4	15.7
25% bleach...	7.99	25.2	22.4
Soda Poplar			
Unbleached ...	0.72	1.5	3.1
11.5% bleach..	3.04	10.5	10.0
20.5% bleach..	6.70	22.0	17.7
30.5% bleach..	10.30	27.7	20.5

These figures, in conjunction with those for loss in weight on bleaching, show that not only is the

weight lost greater as the bleach used increases, but that the fiber remaining is more profoundly altered in its chemical composition.

At first sight it may seem peculiar that the sulphite fibers bleached with the lowest amount of bleach lose less weight than the unbleached fibers corresponding. This is due to the fact that the loss is based on the fiber weighed out, whether bleached or unbleached, and is not calculated back to the original unbleached fiber. Since the bleaching process is an alkaline one, due to the presence of free lime in solution, it dissolves part of the material, which, in the test on the unbleached fiber, is dissolved by the caustic soda. It is quite possible that for this reason there may be less alkali-soluble material after bleaching in spite of the formation of such material by oxidation.

In considering bleaching by hypochlorites, Schwalbe finds that acid bleaching attacks the cellulose more than alkaline, the copper number for acid bleaching in the case cited being 53 percent higher when the operation is carried out in the cold and 24 percent higher for hot bleaching.

Tests on fibers bleached partly with hypochlorite and finished with permanganate show that with sulphite No. 1 the copper number, the loss on boiling with caustic and the caustic consumed are not much different from the results obtained on fibre bleached to the same color with hypochlorite alone. With soda poplar however they are all very much lower, indicating that permanganate attacks soda pulp much less strongly than does hypochlorite. Further tests on another sample of both bleached sulphite and soda fiber, in which the color was greatly improved by treatment with permanganate, verified the result on soda pulp and proved that in some cases it was also true of sulphite.

Practical Considerations

In attempting to make practical application of the points brought out in this discussion a brief resume is sufficient for most of them. In considering the question of loss in weight on bleaching, it is obvious that if a fibre can be selected which bleaches easily, with a comparatively small loss in weight, and which at the same time possesses the desired physical properties, it will be a more economical supply than one which loses a greater weight, and which therefore produces less bleached fibre per ton of raw material. This point is one which is in many cases worthy of careful consideration.

The question of bleaching with permanganates may prove of interest in special cases where it is desired to produce a very white fibre which contains a minimum of impurities in the form of oxycellulose and hydrocellulose. The cost of this process is too great to permit it to be used except in such cases.

It has generally been assumed that oxycellulose is injurious in paper and that it causes it to lose strength and deteriorate in color more rapidly than paper made from normal cellulose. There seems to be very little direct evidence on this point so a test was made by preparing oxycellulose by treating cellulose with nitric acid for twenty-five hours and washing the product thoroughly. Hand mould sheets were then made from sulphite spruce fibre to which 10-20 percent of oxycellulose had been added, and for comparison from the same sulphite fibre without any oxycellulose. Bursting tests were made on these sheets at intervals up to the end of 26 months and while there were variations from time to time they were not of very great magnitude and at the end of the test the decrease in strength was only 1.3 percent for the sheets with oxycellulose as compared with 10.5 percent for the sheets with none. This is, of course, only a single test, but it suggests that the injurious effect of oxycellulose may be much overrated.

Sheets made at the same time were used to study the effect of oxycellulose upon the color of bleached pulps. Strips were cut from samples both with and without oxycellulose and part were exposed to strong light in a printing frame while the rest were kept in an envelope in the dark. It was found that the sheets exposed to light turned yellow to a greater extent than those kept in the dark but, even at the end of two years, those with oxycellulose were less yellow than those containing none. Other tests have been made along similar lines with both sulphite and soda fibres bleached to different degrees of whiteness and while the results are not absolutely conclusive they point to an improvement in color in the exposed samples, the degree of improvement being greater in those samples which were of poorer color to start with. Additional evidence along this line has been obtained by exposing unbleached soda fibre to sunlight, this treatment being found to improve the color to such an extent that it became nearly as good as bleached fibre.

Evidence as to the effect of oxycellulose upon the durability of papers seems to be so meagre and contradictory, and the problem is of such vital importance that a very careful investigation of all its phases should be undertaken.

Closely allied with this problem is that relating to the effect of incomplete washing of the bleached fibre. Under these conditions some of the organic matter which has been oxidized and dissolved by the alkaline bleach solution remains with the fibre, and it would seem that its presence might cause discoloration and lack of permanence. To test out this point sized sheets were made from bleached sulphite and soda fibres which had not been washed at all, and from the same fibres after very thorough washing. The sheets from the unwashed fibres were somewhat yellower than the others and this relative difference was maintained during three months' exposure to all available sunlight and also during eight days' heat-

ing at a temperature of 80°-90° C. It appears from this test that incomplete removal of the dissolved organic matter from the bleached fibre causes the latter to be yellower than if it were thoroughly washed, but that the substances which remain with the fibre do not act upon it destructively nor do the remaining substances cause a progressive lowering of color.

It is fully realized that many of the points brought up in this paper need to be verified on a much larger number of samples, and it is greatly to be hoped that this brief discussion may lead to more extended investigations and the publication of further results.

Useful Information for Power Plant Owners and Engineers

By W. F. SCHAPHORST, M. E.

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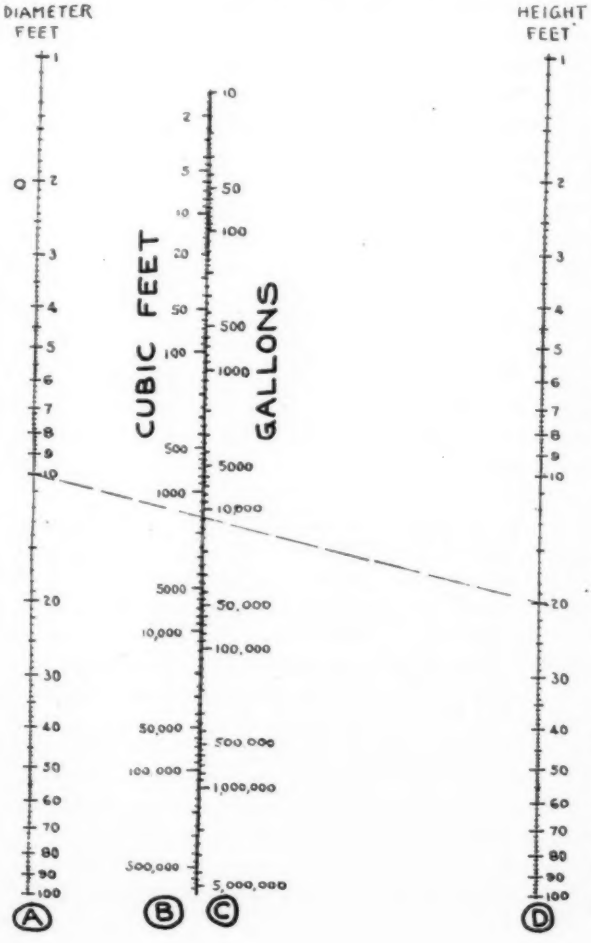
A Handy Chart for Finding Volumes of Tanks

THIS chart will be found useful by anybody for determining the volume of a cylindrical tank without doing any figuring. All you have to do is to lay a straightedge across the chart from known point to known point and the problem is solved.

The best way to explain the chart is to give an example—How many gallons will a tank hold whose diameter is 10 feet and whose height is 20 feet?



Connect the 10 in column "A" with the 20 in column "D" and the answer, found in column "C," is about 11,700 gallons, which is very close. The same act of laying a straightedge across the chart tells us immediately that the volume of the tank is practically 1,550 cubic feet, which shows that the chart is indeed very accurate, although admittedly not "absolutely accurate." Most graphical charts of this type possess a certain degree of inaccuracy, but they are useful because of their simplicity.

This chart may also be used "backwards"; for example, if you want to build a tank or buy a tank to hold a certain number of gallons or a certain number of cubic feet, find that certain number on the chart and swing your straightedge around it until you find the most economical or most desired height and diameter. A little practice will make an expert of you

Exaggerating Losses

IN emphasizing the importance of eliminating losses, the danger of exaggeration is always present.

The writer does not wish to belittle losses or to belittle those who exaggerate, but by way of illustration here is an example.

The following statement appeared not long ago in a rather widely read manufacturer's publication and since its appearance in that publication it has been quoted by manufacturers in their zeal to sell certain products. The statement is:

"A ½" diameter valve stem leaking all around the stuffing box will blow about 40 pounds of steam per hour with 100 pounds pressure in the valve. Ten stuffing boxes leaking for one full day will waste 1,600 pounds of coal."

This looked rather gigantic to the writer and on checking up the statement, using Napier's well known rule that the weight of steam flowing into the atmosphere per second through a given opening is equal to the area of the opening in square inches mul-

tiplied by the steam pressure in pounds per square inch divided by 70. Or, to find the area in square inches, which is desired in this case, multiply the number of pounds of steam lost per second by 70 and divide the product by the steam pressure in pounds per square inch. On working this out, the area of the opening was found to be .00778 square inches, which is the area of a hole about 3/32 inches in diameter.

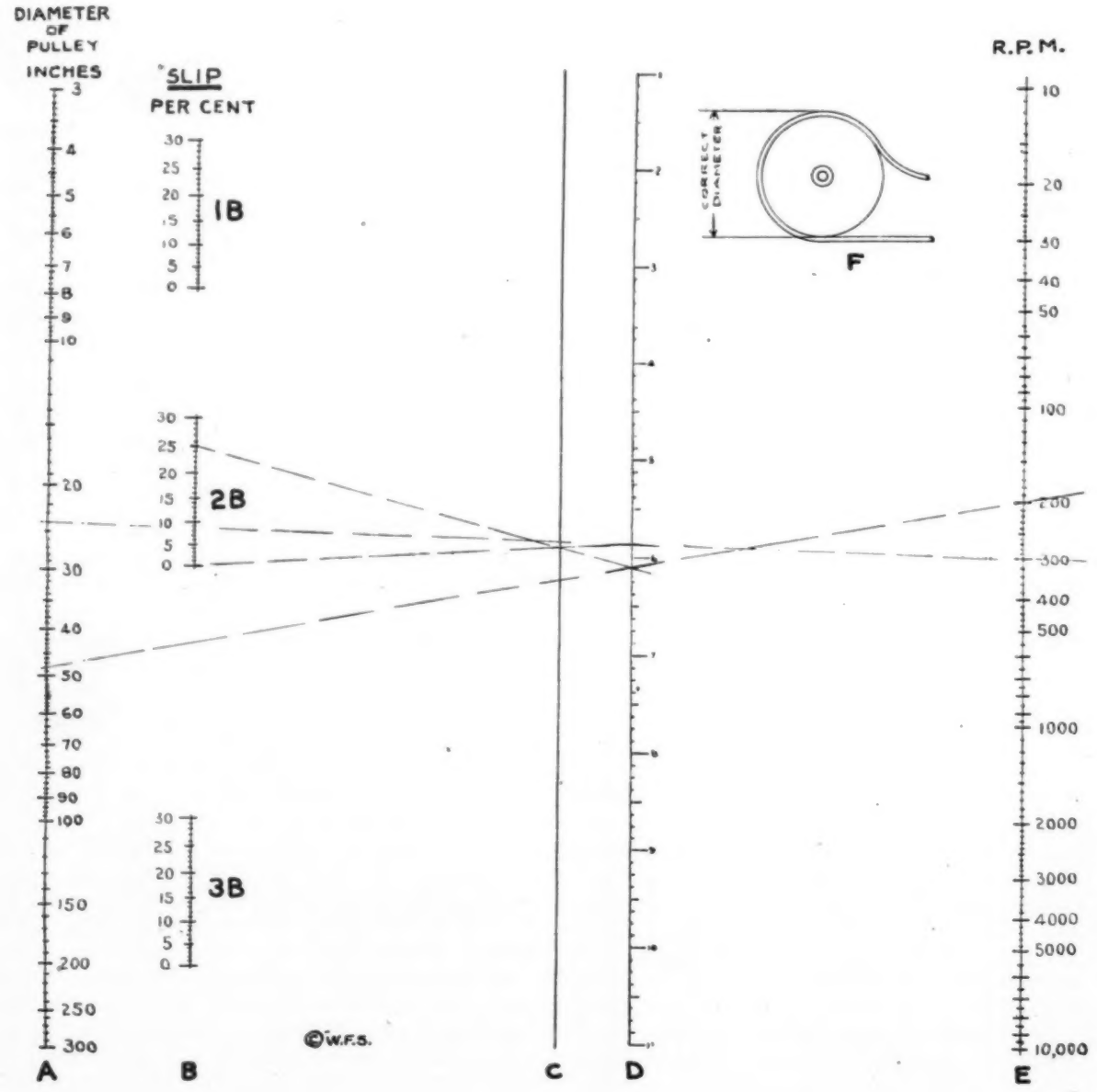
In other words, each of the ten stuffing boxes mentioned above would have to have an unrestricted opening into the atmosphere 3/32 inches in diameter in order to waste 1,600 pounds of coal, assuming that one pound of coal will evaporate an average of 6 pounds of steam.

Such a loss as this would hardly be possible unless the stuffing box contains no packing whatsoever, and even if the stuffing box does contain packing this tremendous loss is questionable. If the stuffing boxes contain packing of some kind to at least restrict the steam flow, the writer asserts that it would be impossible to lose 1,600 pounds of steam through a standard well made valve of ½" diameter valve stem.

A Chart for Quickly Determining Belt Slip

WE OFTEN read about "per cent of belt slip" without knowing exactly what we are reading about. It sounds something like E PLURIBUS UNUM to us and we gladly let it go at that.

Now, belt slip is something very definite—so defi-



nite that it can be measured with a rule and a watch, and the purpose of this chart is to simplify the effort connected with measuring belt slip to the extent that you will actually enjoy doing it. You won't have to do any computing whatsoever.

If you want the formula on which the chart is based, this is it: per cent of slip $= 100\ (1 - \frac{d\,n}{D\,N})$.

where d=diameter of driven pulley in inches;
n=r.p.m. of driven pulley;
D=diameter of driving pulley in inches;
N=r.p.m. of driving pulley.

In the first place, sketch "F" on the chart shows the correct way to measure the diameter of a pully when a belt is on it. It is the same as measuring from "middle to middle" of belt so far as the actual result is concerned, but this is more convenient—quicker.

Unless the belt thickness is considered, you may sometimes get some surprising results, and you may say that "there is no such thing" as slip in your belt, and you may condemn this chart as being a "false alarm." So, I wish to warn you—make measurements accurately if you want accurate results.

The best way to explain the chart is to give an example, so we will take this exaggerated case: The diameter of a driving pulley is 48 inches, and it runs at a speed of 200 r.p.m. (Note the dotted line drawn from 48, column A, to column E, and note where it intersects column No. D. The point of intersection with column D is what we are after.) Next, the diameter of the driven pulley is 24 inches and it runs at a measured speed of 300 r.p.m. (Note, again, the dotted line between these two points and the intersection between 5 and 6 in column D. This point of intersection is what we want.)

Roughly, each little space in column D represents 14 per cent of belt slip. Since the two points we have located are about two spaces apart the total belt slip is, roughly, 28 per cent. Actually, according to the above formula, the slip is 25 per cent. To get the exact slip on the chart without doing any computing draw a line from the "upper point" to "O" of either "1B," "2B." I have chosen "2B" because it is closest to the points of intersection. Note the point of intersection of this latter line with column C, and through that point of intersection and the "lower point" in column D the last straight line is drawn, and it will be found to cut "2B" at 25. The slip, therefore, is 25 per cent.

I have chosen an exaggerated case here for the sake of simplicity. A little experience with the chart and you can tell closely "with your eye" whether or not there is any serious slip, remembering that each space in column "D" represents about 14 per cent slip, a half space 7 per cent slip, etc.

If the two main lines between columns A and E intersect at the same point in column D, there is no slip. In this example, if we remove all belt slip the driven pulley will run at a speed of 400 r.p.m., the lines between columns A and E will both intersect the same point in column D, and "1B," "2B," and "3B" become useless, of course.

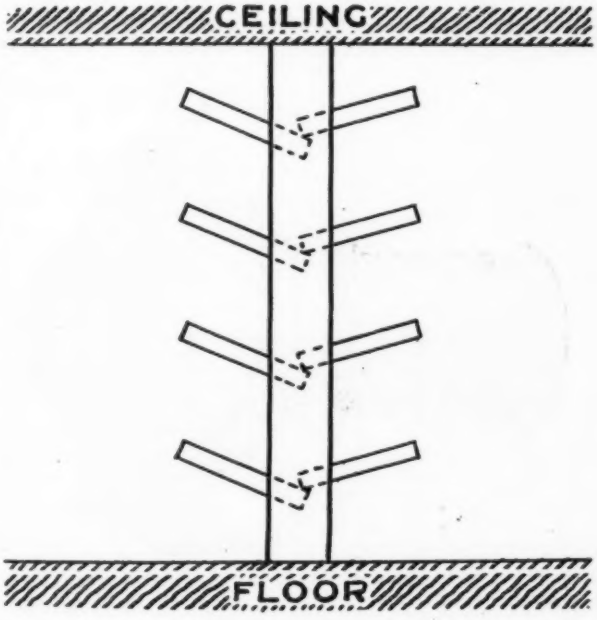
To be sure, in using this chart you don't have to really "draw lines" at all. Just lay a straightedge across or stretch a fine thread across and note the points of intersection. I prefer using a fine thread.

It will be noted that the range of the chart is very wide; from 3-inch pulley diameter to 300 inches and from 10 r.p.m. to 10,000 r.p.m. It, therefore, will easily cover all ordinary cases.

An Excellent Rack for Heavy Materials

THE superintendent of the paper mill will find the rack sketched below to be an excellent one for heavy materials—pipe, bars, angles, etc., and even for lumber.

Simply bore some holes in sturdy upright timbers at an angle as indicated, insert short pieces of pipe of suitable length in the holes as shown, fasten the vertical timbers both at the top and bottom, and you have a good serviceable rack. By boring holes from diametrically opposite sides and having "shelves" on both sides, it is evident that the rack is more liable to be properly balanced than where one side is used only.



A Revolution in Blower Design

THE field of usefulness for propeller blowers until recently has been very limited. With the exception of low duty ventilating fans, propeller blowers

have been used almost exclusively for undergrate draft, as on hand fired boilers or with chain grate and overfeed stokers, on account of the low efficiency at higher pressures.

A new type of blower is illustrated herewith which is known as the Coppus Vano Blower. It is a screw-

Guide Vane Casing

blade propeller blower which delivers the air parallel to the axis—in other words, the air leaves in the same direction as it enters. It differs from all other propeller blowers in the following three points: first,

Vano Blower with Electric Motor Drive

it operates against a pressure up to 8″ water and therefore can be employed where, until now, only centrifugal blowers could be used; second, its efficiency runs up to 80%; third, the power consumption at constant speed is practically unaffected by variations in air delivery or pressure.

On account of these three principal features, the Coppus Vano Blower is adapted to such uses as undergrate or forced draft for hand fired boilers, chain grate, overfeed and underfeed stokers; induced draft; air heating and drying installations; cooling of electric motors and generators and ventilation of factories, boiler rooms, etc.

They are built either as single unit machines with one shaft common to blower and driving unit (steam turbine, air turbine, or electric motor), or with shaft extension for overhanging pulley or flexible coupling for connection to steam turbine or electric motor to be mounted on a common base plate.

Why Belts Are Stiff

AN EXCELLENT way in which to make a study of belt fibre action is to take a pad of scratch paper, a magazine, or something of that sort, and bend it. It is easy to bend a pad of paper when the motion of the ends of the paper is unrestricted. You will note that one sheet slips along on the other a short distance. There is no tension on the convex side or compression on the concave side of the bent pad. Glue the ends together or hold the ends tightly with the hands, however, and it will be found more difficult to bend the pad. There will be a "buckling" on the concave side. The convex side will be in tension.

Glue the whole pad together by saturating it in glue and drying and you will have a chunk of material that will be as difficult to bend as cardboard or even as difficult as wood. This is because buckling becomes impossible on the concave side if the gluing job is properly done. There is no sliding. There is a certain plane close to or at the center that is neither stretched nor compressed when the "board" is bent. That plane is called the "neutral axis." On the concave side of that axis the fibres of the board are in a compression. On the convex side the fibres are in tension.

The thicker the board the greater the force required to bend it. This is true because the fibres farthest away from the neutral axis have a longer lever arm than in a thinner board. And that is why steel I-beams, channels, Z-bars, etc., are made for engineering structures—to put the outside steel fibres as far away as practical from the neutral axis.

This explains why belts may be stiff or pliable. The dry, hard leather belt that is not lubricated in its fibres is naturally stiff because the fibres have difficulty in rubbing one over the other. Thus you will find it more difficult to bend a pad of sand paper or emery paper, for example, than a pad of smooth writing paper. The dry, hard belt does not permit its fibres to slide on one another so easily on the tensile side nor on the compression side. The treated, lubricated belt, on the other hand, permits its fibres to slide with greater freedom. By treating the belt,

there is no resultant grinding of one fibre on another as occurs in a pad of sand paper.

This method of studying the belt will clear away many of the points that have possibly been troubling some belt users. It explains why double or three-ply belts are stiffer than single belts. It explains why treated belts are more pliable than untreated belts of the same thickness. It shows why lapped cement joints have a tendency to loosen or "shear" and why the cement used in any belt must be good. Pick up a pad or a magazine one-fourth of an inch thick and try it.

Corliss Valves for Steam Traps

BY the application of the Corliss valves in steam traps, many advantages are secured over the ordinary types of traps, and this improved type of trap is being rapidly adopted by progressive plants throughout the country. This type of trap is composed of six parts which require no packing or gaskets. The Corliss valve, due to its oscillating action, never draws away from its seat, consequently no trouble is experienced with scale, grit, mud and other kinds of foreign matter depositing on the valve seat. The construction is simple as shown by the illustration, Fig. 1. The valve is always sealed, so the condensation never entirely leaves the trap. Steam cannot escape, and mud, scale, or foreign matter collecting in the bottom of the trap is not disturbed at each discharge. One important feature of this trap is its low maintenance cost. Every trap equipped with the Corliss valve is guaranteed by the manufacturers to remain steam-tight for a period of not less than two years, when operated under reasonable conditions.

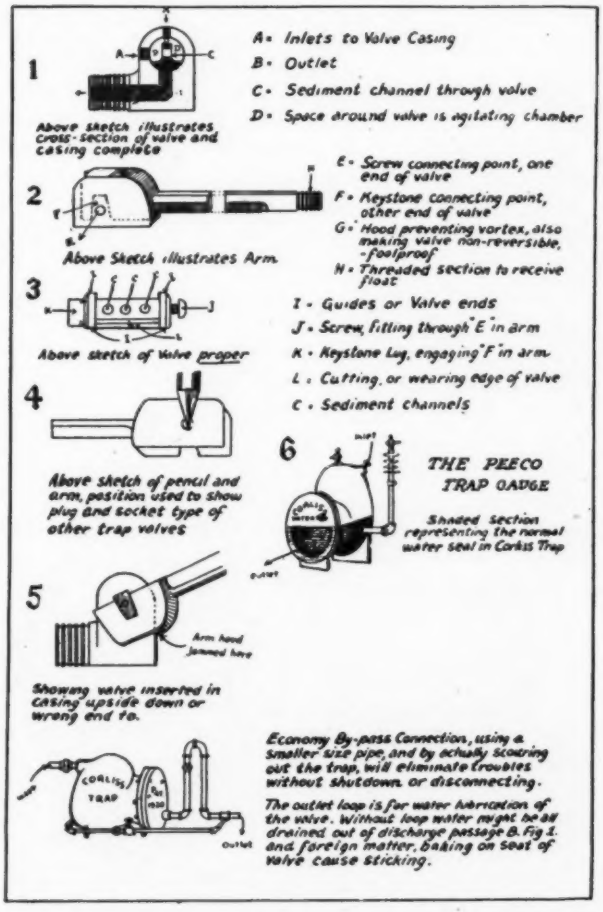
The accompanying cuts show the six component parts of a trap fitted with the Coliss valve. Figure 1 shows the valve, its oscillating or semi-rotary movement, combined with a differential pressure, holding it tight to the seat, the two inlet passages (A & A) causing opposing flows of condensate or eddy currents, which produce a natural agitation, eliminating the precipitation of solids in the valve chamber (DDDD), the channel (C) through the valve proper, preventing any accumulation or banking up of sand, mud, or other foreign matter behind the valve.

Channels (C) also assist in producing eddy currents.

Figure 2 shows the arm, the screw through hole (E) in one side being made up tight to steady the arm and prevent possible movement, due to one-sided thrust of water as in marine service, or sudden gushes of water due to peculiarities of service or inlet piping, the real strain being taken up by Keystone lug on the opposite side to screw.

The cover section or hood (G) has two definite features; first, as illustrated in Figure 5, which prevents incorrect assembly, due to the locked position of the arm holding the float up, where it would strike the top of the body and prevent putting on the trap head; secondly, that when the valve is opened full, or nearly so, the holes "A" in top of valve casing are covered, preventing any tendency to form a vortex, the most common cause of steam loss in other traps, even when their gauge glass shows sufficient water seal, and tight valve.

Figure 3. The valve is set (when trap is shipped) so as to maintain a high water seal over the valve and to leave considerable clearance between float and base of body, so that if edge of valve (L) did wear


A. Inlets to Valve Casing
B. Outlet
C. Sediment channel through valve
D. Space around valve is agitating chamber
1
Above sketch illustrates cross-section of valve and casing complete
E. Screw connecting point, one end of valve
F. Keystone connecting point, other end of valve
G. Hood preventing vortex, also making valve non-reversible, -foolproof
H. Threaded section to receive float
2
Above Sketch illustrates Arm.
3
Above sketch of Valve proper
I. Guides or Valve ends
J. Screw, fitting through "E" in arm
K. Keystone Lug, engaging "F" in arm.
L. Cutting, or wearing edge of valve
C. Sediment channels
4
Above sketch of pencil and arm, position used to show plug and socket type of other trap valves
6
THE PEECO TRAP GAUGE
Shaded section representing the normal water seal in Corliss Trap
5
Showing valve inserted in casing upside down or wrong end to.
Economy By-pass Connection, using a smaller size pipe, and by actually scouring out the trap, will eliminate troubles without shutdown or disconnecting.
The outlet loop is for water lubrication of the valve. Without loop water might be all drained out of discharge passage B. Fig 1. and foreign matter, baking on seat of valve cause sticking.

away, the float would come down and valve turn in its casing, finding a new seat. This is the all-important feature of mechanically compensating for wear and proved by many years' actual service tests.

Figure 4 shows the plug and socket type of valve, similar to that used in most steam traps. This valve makes a good fit as long as the seat is clean and free

from any obstruction, **but** if the valve had power to close and a piece of pipe scale should become lodged on the seat, as it was closing, the result would be a dent, and the dent would become a leak, requiring at least a shut-down and labor to grind in the valve, but more likely the loss of several times the trap's value in wasted steam. This **could not** happen with the Corliss valve, because the valve never leaves the seat; because the valve and arm with float on far end gives a powerful shearing action, and further, if the valve was nicked it would automatically change its position and compensate for the wear.

Another example of Corliss valve superiority is illustrated by a man's bath-tub. Perhaps a tub contains 13" of water, or half a pound pressure per sq. inch, but note the effort it takes to pull out the plug. Then let it down slowly and feel it jump in with a slam and jar; such action being but a mild example of what goes on under high steam pressures. Against the above compare and consider the smooth, powerful sliding action of the Corliss oscillating valve—no jar, where the slightest opening gives the same effect as relieving gate-valve friction and pressure by opening a by-pass, and finally, remember that the Corliss valve varies the size of discharge opening according to the rate of flow.

Safety Applied in the Paper Industry

The Yard Department

By WALTER A. GLEASON, Hammermill Paper Co.
Chairman, Pulp and Paper Section, National Safety Council

THE organization of the Pulp & Paper Section of the National Safety Council was accomplished some six years ago. Those of us who have been active in the work of the section feel that we have derived a great many benefits since its inception, which have been of material assistance to us in our work.

The practical information we are receiving through our membership in the Council, by means of the National Safety News, Safe Practice Pamphlets, Bulletin Service, etc., we feel is of very great value to us in our work, and the results we have attained are due in a measure to its co-operative assistance.

The present officers of this section have set out to make this a banner year, and we hope the results will equal our expectation. The Bulletin Committee, under the direction of Mr. M. G. Hoyman, Kimberly-Clark Company, has already met and planned enough bulletins to take care of our needs for the year.

The Membership Committee, under the direction of Mr. O. M. Porter, American Paper & Pulp Association, is planning a drive for new members a little later in the year, which we hope will have the desired results. We feel that the more members we secure, the greater the benefits for all of us, because it is only by co-operative measures that we may gain results.

The Program Committee in charge of the program for the Annual Congress, is under the direction of Mr. F. H. Rosebush, of the Nekoosa-Edwards Paper Company. They are now engaged in the preparation of this program, which will, as in past years, probably be a source of information beneficial to all who attend.

The keeping of uniform accident records by all members of the paper industry, as outlined by the National Safety Council, affords a splendid means for the comparison of statistics. This is one way whereby we may judge if our efforts towards Accident Prevention are truly successful.

Hazards encountered in the manufacture and handling of paper are many. Unloading and piling wood and the handling of other raw materials under all conditions of weather, is the first operation and one that requires the utmost care to prevent accidents. Further manipulation of these logs in the wood room in the process of conveying, sawing, barking, washing, chipping, and storing, is not without its elements of risk. Making of acids, digester hazards, wet floors, screening and washing, and the trucking and piling of stock from the wet machines are responsible for many safety problems in the sulphite mill. Carelessness around beaters and beating engines, along with trucking of heavy pulp over wet floors, lends an element of hazard to the beater room.

Thoughtlessness around paper machines in the process of drying, calendering, and rewinding has been the cause of leaving the marks of the trade on many of the operators. The finishing department, including cutting, trimming, sealing, packing and shipping of paper, offers many opportunities for the careless man to inflict injuries upon himself and his associates.

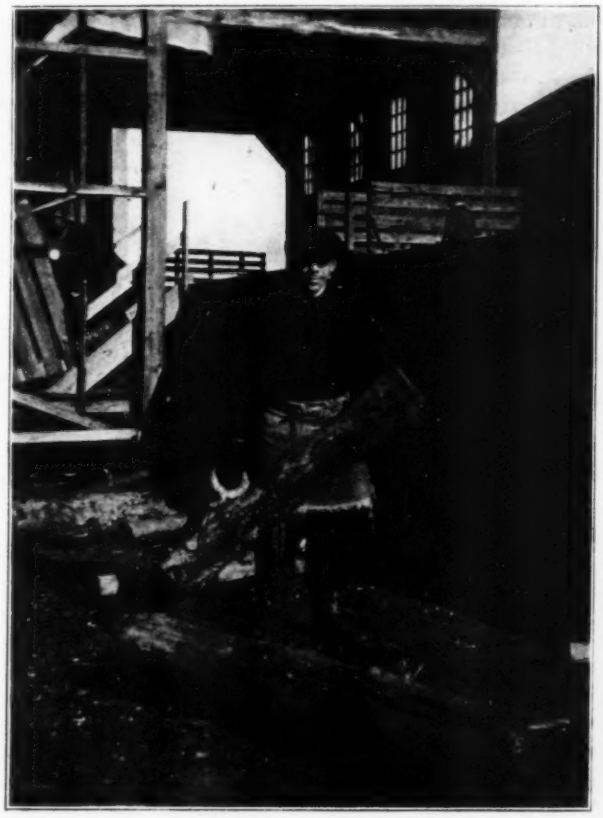
Handling and repairing large machinery peculiar to this industry also have elements of chance, and extreme care must be used to prevent accidents.

Unloading and Handling

This article will not attempt to outline all the hazards of paper making. Subsequent articles will cover separately each step in the process. This article has to deal with the first step—the unloading and handling of pulpwood and other raw materials.

This work must go on in all kinds of weather.

Pulpwood is one of our bulkiest raw materials and its handling requires great care to prevent accidents. In a typical mill, logs are taken from the boats by means of cranes lifting two-thirds of a cord on a chain sling, and are loaded on railroad cars, properly staked to prevent the slipping off of the wood. It is then transported to the storage yard, where the



Suppose the hook slips

process of unloading begins. This is done by means of a crane with a grappling apparatus, by hand, or by combining the two methods. In the hand process, the unloading and piling are done at the same time, the men placing each stick as they toss it off the car. They become very proficient in this line and seldom have to leave the car to straighten the pile. The great danger in this method is the spearing of themselves or partners with woodhooks. This is best eliminated by not having over four men on one car. Properly-made hooks with large handles, long shanks, and a large, well rounded curve help to prevent injuries.

Extreme care must be used in wet or cold weather when logs are slippery and frozen, to see that the hooks are securely placed in logs to prevent their slipping and striking their hands and feet, causing injury.

After the wood is piled, care should be taken to construct bulkheads at the end of the pile to prevent it giving way and injuring anyone. This is done by laying the wood crisscross, the outer end raised higher than the pile.

Unloading with a crane has the usual hazards of crane use. The operator should be on the alert to see that workmen do not pass under or near the load, that there is proper clearance between the crane and piles, and must accept only standard signals given by the proper person.

We read occasionally where someone in loading from a pile attempts to start at the bottom or outer edge, and is severely injured or killed by the wood falling on him. In one case on record a yard man, new at his work, was killed in attempting to do this on a pile of frozen pulpwood, just a second after being warned by one of his fellow workers.

Another large commodity is coal, usually unloaded by means of hopper car doors, which can be operated safely by means of safety wrenches. Sand, limestone and other bulk materials usually handled by crane can be safely handled in the same manner as pulpwood, by the crane operator observing the usual precautionary rules stated before.

Rosin and bleach are usually handled in barrels or

A safe bulkhead

drums, and where space is available are rolled down a gang plank, in which case care must be taken to see that roadways and passageways on either side of gang plank are properly protected. Care should

be taken in opening doors so that loose barrels do not drop out and injure workmen. Sulphur, clay and alum are usually in bulk, and before unloading the usual precautions should be taken—the first of which is to take care of the cleats which are tacked on the doors of cars. This is done by removing or bending over nails and putting them in their proper place. Second, see that the toe boards are rightly placed and nailed to hold them solidly. If they are not secure, an injury is usually the result. Third, by using the right kind of equipment, such as the proper trucks, wheelbarrows, etc., and not overloading so that workmen have to strain themselves to handle them, as this sometimes causes slips or falls.

Proper clothing is also essential, including shoes, gloves, goggles, so that men may be protected against the handling of material such as bleach and acids.

Timber and lumber should be carefully piled up. This not only reduces the danger of injury in handling, but conserves space and keeps the yard in an orderly manner. Other materials should also be handled with the same view in mind, as neatness and orderliness tend toward Safety. The careless workman does not fit in where neatness and orderliness are maintained.

Tools commonly used in the yard, such as picks, shovels, sledges, chisels, and others, should be inspected regularly and kept in proper condition. Accidents occur less frequently when tools are kept in good order.

When laying out yards in new plants, it is advisable to do so with the view of having proper drainage, clearance for tracks, lighting, and storage space. In an old plant where this is not all possible, materials can be piled neatly to occupy as little space as possible. Where it is impossible to maintain proper track clearances around buildings, signs and other warnings should be given to prevent railroad workers and others from being injured.

The storage of all materials should be planned with a view of the saving of life and limb. If this can be accomplished by means of a little extra effort on our part, our efforts will not have been in vain and we will be well repaid.

The accident record of a yard department, like every other department, depends in a great measure upon the foreman. If he is of the right type, conscientious, whole-souled, and imbued with the Safety spirit, his department record will show it. If he is of the other type, the men in his department will soon drift into careless habits and practices.

The writer has not attempted to lay down rules for a model yard—even if there were such a place—but where an honest-to-goodness effort is made to keep it in the best possible order, accidents seldom occur. If you are of the opposite opinion, try it and see the results.

War on Waste

By H. M. GRASSELT

THE practice of thrift and economy has become vital to the individual citizen as well as to industrial and commercial life. Our success as individuals and as a nation depends to a large measure upon our ability to save and to economize.

That not-to-be-forgotten November day of 1918 marked not only the end of the greatest conflict the world has ever witnessed, but it also heralded the beginning of a new era. Readjustment, economy and thrift became the slogan of government, industry and commerce. Totally changed economic conditions and the vigorous revival of European competition are compelling our industries to eliminate waste and develop the utilization of by-products and scrap materials.

The paper and allied industries have many contrivances to save or reclaim materials and frequent new inventions or improvements along these lines denote progressive and deeper understanding of the need of the hour.

Hand in hand with the application of modern devices for saving and reclamation of raw materials goes the preservation and salvage of scrap materials. How sadly neglected in many mills is the handling of those materials! The object seems too small, too insignificant, in order to command special attention—and yet, it pays to preserve discarded felts and wires, scrap metals, dust, muss and so forth.

Even small mills may annually realize a considerable amount from the sales of scrap materials, and from disposing of machinery which is no longer being used. It is well worth while to accumulate these various materials and sell them at an opportune time, instead of having them scattered throughout the plant, from where they disappear or are rendered useless entirely. A small storeroom will suffice for old felts and wires and other more valuable scrap materials, while a corner, partitoned off in the repair shop, will do for scrap iron and other waste metals which cannot be reclaimed for home use.

Systematic preservation of scrap materials, insignificant though it may appear, will not only repay well time and efforts, but also add to order and efficiency throughout the mill.

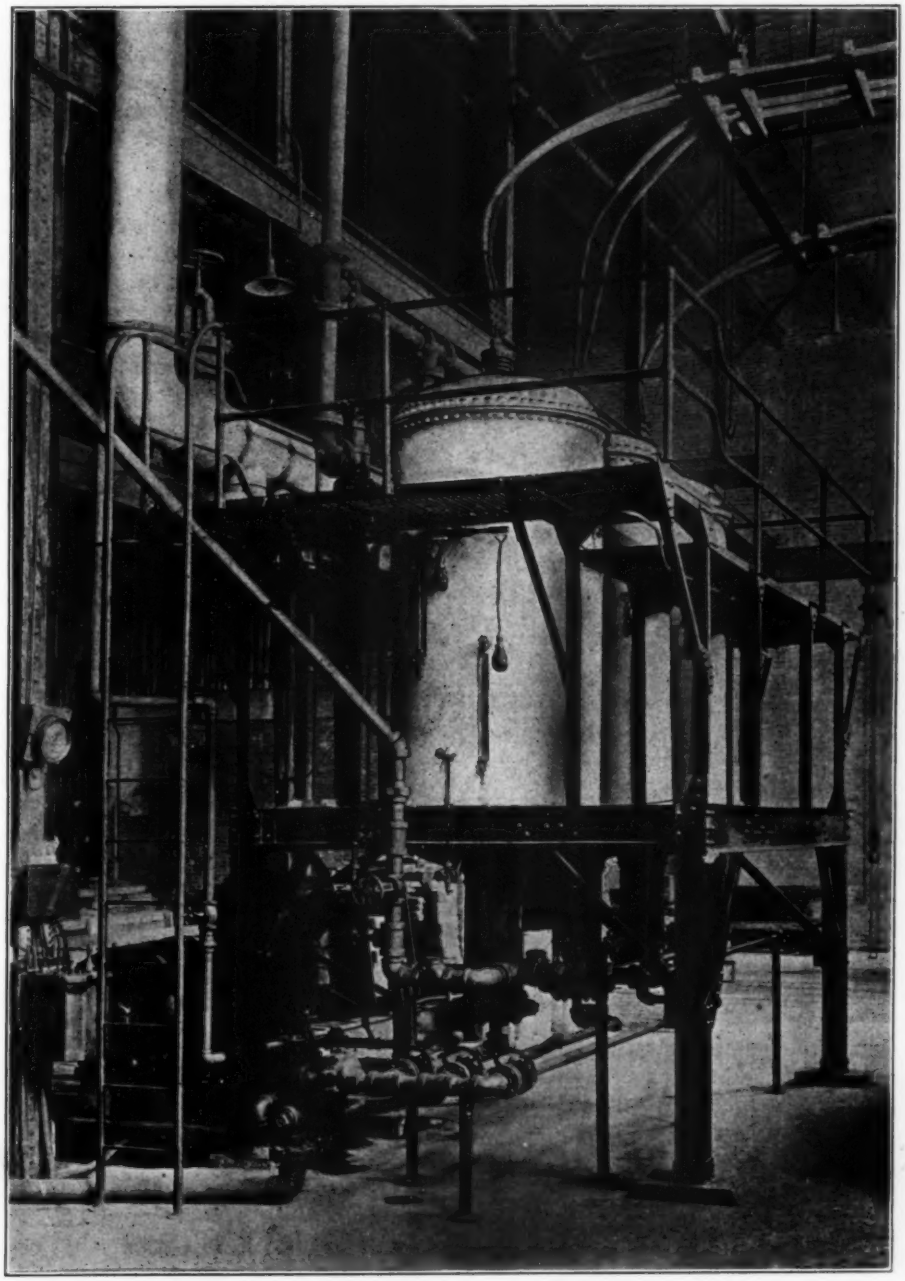
Safety First is more than philanthropy. It has now become a vital fundamental factor in the economics of business, says the National Safety Council.

Steam Generation by Electricity

By FRANK HODSON

AN ELECTRIC steam generator utilizing the principle of heating produced by resistance to flow of electric current through water has recently been placed on the market by the Electric Furnace Construction Co., Philadelphia. This new heating apparatus is called ELECTRO Steam Generator.

Steam is generated at any specified pressure by means of high tension alternating current led directly through electrodes of special design into the water to be evaporated. A vertical tank is used, constructed according to approved boiler practice. The whole apparatus occupies only a fraction of the space re-



2,000 B. H. P., 20,000 K. W., 6,600 volt, 3-phase "Electro" Steam Generator installed in the paper mills of the Belgian Industrial Co., Ltd., Shawinigan Falls, Quebec, Canada

quired for fuel-fired boilers, and the cost of installation is very much less.

The amount of steam generated, the pressure and amount of electric power used are governed by the height of water in the vertical tank. This is controlled and regulated by standard valves, rendering the whole operation practically automatic.

Any water that is suitable for the ordinary boiler is satisfactory, and it is not necessary to install water-softening apparatus. Either condensate or raw water can be used or a mixture of the two. No part of the Electro Steam Generator is exposed to a higher temperature than that of the steam, and the only part subject to slight wear is the electrodes, which may be replaced annually at a nominal cost. There is no scaling or erosion of tubes or shell due to high temperatures.

The most important application of the Electro Steam Generator will be found in industries located within the range of hydro-electric power plants, where use may be made of surplus energy or water running to waste. Due to the inability of ordinary power consumers to operate 24 hours per day, the load factor at most power plants runs from 60 to 80 per cent. Complete use may be made of this off-peak load, which is not now used, by the installation of the Electro Steam Generators, and the load factor of the power station can be considerably improved. The generators operate with 98 per cent thermal efficiency and unity power factor. The Electro Generator is very flexible and it can be paralleled in with existing coal or oil-fired boilers and just operated on these off-peak loads—when cheap power can be had. One large installation operates only on Saturday night and Sunday, and the resultant saving in coal paid for the whole cost in one season. In some cases, hydro-electric power companies are taking advantage of their surplus power and install the Electro Steam Generators in central locations and distribute steam to a number of nearby industries, selling steam at a fixed rate per 1,000 lbs. In other cases, where an individual customer is a large user of steam, the power company has installed the generator in customer's plant.

Wherever fuel is expensive and power can be had at cheap rates, the Electro Steam Generator is economical. This condition applies particularly to industries like paper and pulp, lumber, textiles, etc.

Many concerns purchasing power contract for blocks of electric power at a fixed rate per horsepower year. Very few of these use this continuously, and during idle periods the energy which they pay for can be converted into steam for heating or industrial purposes.

The chief advantages claimed for the Electro Steam Generator are that the initial and operating costs are very much lower than on fuel-fired boilers, the space occupied is much less, there are no expensive buildings, smoke stacks, storage for oil or coal, no fuel or ash handling equipment, no mechanical stoking devices or water softeners.

Renewals, repairs, cleaning and shutdowns are reduced to a minimum, as the highest temperature is that of the steam.

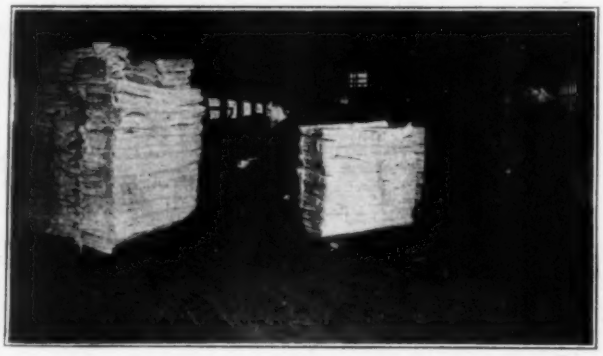
A number of large generators have been in successful operation for some months and already over 100,000 kilowatts of generators, representing 10,000 boiler horsepower, are running or being installed of the type here described.

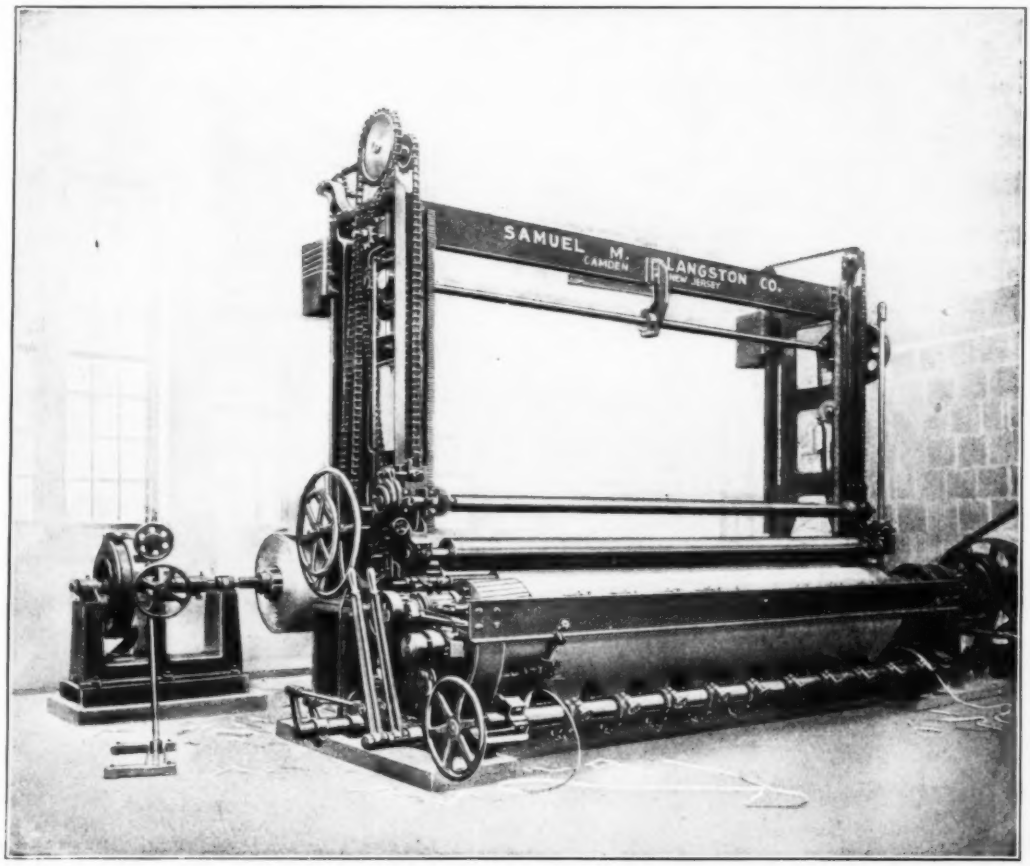
The accompanying illustration shows an installation of a large Electro Steam Generator in the plant of the Belgian Industrial Company, Ltd., Shawinigan Falls, Quebec, Canada. This installation is of particular interest, in that the Belgian Industrial Company purchases energy from the Shawinigan Water & Power Company in the form of steam and not in the form of electric current, as is usually the case. The power company furnishes the current to the steam generator, but as a basis of payment the steam is metered instead of the current. This is said to be the largest plant ever constructed and the first to be put in commercial operation in the Western Hemisphere.

Lift Trucks Are Big Advantage

ASIDE from the saving of good hard dollars, there are many advantages which add greatly to the value of a lift truck. It speeds up work and adds life and "go" to the organization. With materials dragging around—reaching machines behind schedule—the workmen soon become sluggards, but when the materials are always on the spot—when things go scurrying here and there making every handling schedule—then things move.

The accompanying illustration shows a type of lift truck which is capable of lifting up to 16,000 pounds —eight tons. One man does the work that requires five men with the old-fashioned "wagon" truck. Yet every advantage of the old truck has been retained. It will not tip over—it has four broad wheels—it pulls far easier, because of roller bearings. This type of truck fits in everywhere—it gets into the corners, turning in its own length and protects the load and the operator.





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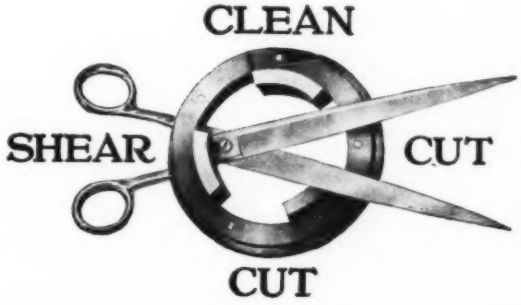

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Six Definite Things That Workers Want

4—A Chance to Learn

By JAMES H. COLLINS

(Copyright, 1922, by J. K. Novins)

UP IN the Canadian woods they were getting ready to take out a big "spar tree." There was a college man in camp. He thought he knew how to use an ax—had often cut down small trees back home. He asked the foreman if he might cut this giant fir. The foreman's refusal was kindly:

"There is only one layout for that tree," he said. "She must go between that hemlock and the tall spruce. If it falls anywhere else, our work will be balled up—you might even lock it onto another tree. It takes three years to make a good 'faller.' The head 'faller' and I must cut this one."

The college man was humiliated, but got some idea of the technicalities in work like logging, popularly supposed to be "unskilled."

The next day was Sunday. He and the foreman had a talk. The latter said he envied the college man's knowledge of geometry, algebra, and even physics, for he felt that with a background of science and his practical experience, he could learn lots more about logging. A little science would enable him to handle forest giants much more skilfully, quickly, and with less drudgery, and save hundreds of men from being killed and hurt every year in the woods for lack of theoretical knowledge. Canada is now studying ways to give such men the theoretical training needed in their every-day work through the "university in overalls."

It used to take nine tailors to make a man, and at least three tailors to make a suit of clothes. Today, it takes several dozen workers to make a coat. Formerly, the cobbler made a pair of shoes, but now shoe-making is cut up into a regular jig-saw puzzle of little tasks.

"Where can we get all-around men who know how to tackle a machine-shop-job—maintain a railroad track—repair a watch?" executives are asking—everywhere the same complaint. After cutting work up into specialties, and the specialties into bits that can quickly be taught a greenhorn, industry now finds that it has eliminated the all-around worker who knew the whole trade, and could be counted upon for supervision and improvement. Moreover, it needs all-around men of kinds not developed by old-fashioned apprenticeship—men who understand designing, selling, accounting, management and the line, from the theoretical as well as the practical side.

Things have gone so far that industry is threatened, and the worker is threatened even more. It is often said that the present-day industrial worker is a machine, but the blunt truth is that he is less, for his task is often so simple and impersonal that he can be more easily dispensed with than the machine he operates.

When the teacher sent little Jakie Cohen home with a note asking that his neck be washed, his mother wrote back: "Don't wash Jakie—learn him!" And that is the answer to the executive's question: "Don't complain about workers' knowledge and ability—teach them."

The employee may be more far-sighted in this matter than the boss. One of the correspondence schools that specializes in technical training has lately begun publishing a monthly journal called "Trained Men," entirely devoted to this subject of employee education, emphasizing its advantages to the executive more than those for the employee—largely because the latter has already been "sold" on industrial education. That employees are very often making their own efforts to acquire the theory behind their jobs is shown by the number of students in nearly nine hundred manufacturing, commercial, transportation and mining corporations. More than three hundred railroad companies have employees who are studying correspondence courses, $80,000 worth of such courses having been sold to employees of a single railroad in less than five days. Very often, an educational movement of this sort will get under way among employees almost unknown by employers. Real desire to learn furnishes part of the impetus, and systematic sales work and supervision by correspondence sales the rest. Employers become interested when the correspondence schools report to them the progress of individual employees, and when promotion demonstrates that such training is sound, employers frequently offer to pay part or all of the tuition fees for employees who will study courses within their abilities.

There are several distinct kinds of education needed in nearly every business.

The commonest is simple task teaching, which may comprise anything from showing Johnny, the new office boy, how to wield a broom, up to the multiplication of riveters in a shipyard by separating the work into its basic parts, and showing an expert riveter how to teach it to the novices—something that was done most successfully during the war. Task teaching quickly gives the worker earning power, and the employer production. There it is apt to stop for both of them, however, unless linked to the tasks that go before and come after, and the theory behind all of them. Probably not one worker in ten is interested beyond his task. But the tenth fellow, who is, can be developed. Wider knowledge

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will fit him for supervision, inspection, transfer from department as the need arises. If the employer neglects his training, he will train himself and market his increased ability in some other plant.

Task teaching is pretty much a plant activity, because tasks differ in each plant.

Theory teaching is seldom successful as an exclusive plant proposition, say educational experts. Only the largest corporations can afford to maintain private schools for teaching subjects like engineering, mechanics, administration, metallurgy and the like. Good teachers are scarce and costly. Good text-books written from the slant of a given business are even more expensive. Employees who might benefit by the school are often widely scattered. The breadth of such studies peculiarly adapts them to the text-books, teachers and systematic encouragement of the correspondence schools.

How a thing is taught makes more difference in results than is expected by the "practical" man who criticizes teachers for "too much theory." As an example of good teaching, take a subject which many workers are anxious to study—the English language, which is needed by the foreign-born, as well as common school studies by workers born in this country, but enjoying little schooling. Given ordinary text-books, the Italian or Slav would find himself hopelessly entangled in grammar. Using the lessons prepared by Dr. Peter Roberts, a real teacher, Giovanni or Jan find themselves learning words that they can use every day in finding a job, buying clothes or taking a railroad journey.

Still another important field of teaching is that which imparts the things that lie beyond even the technical theory of a business concern or an industry—its policies, spirit, broad tendencies, and the general direction of its invention and progress. These are not taught in classes, but spread through encouragement of reading—technical and scientific journals and books. Some business concerns subscribe to enough copies of important periodicals to maintain a circulating service of marked copies, each article automatically coming to every person in the organization who ought to read it. Other concerns, finding many books purchased by the management are scattered through different departments, have brought them together in a special library, to which every interested employee has access. Yet again, each broad subject pertaining to products, processes, research, management and the like, is systematically covered by clippings and filing important articles as they appear, with a portfolio devoted to each subject.

It is now widely admitted by employers that the all-around quality in workers must be restored by teaching.

It is not so widely realized, however, that workers must be taught—that they see in study their chief opportunity for advancement, and are willing to make real sacrifices to acquire knowledge. Not all workers appreciate chances to learn—perhaps not one in ten, or even one in twenty. But those who do, the intelligent, ambitious, healthy-minded men and women, are enough to leaven the mass and furnish the initiative and leadership that has lately been disappearing from American industry.

Power Plant Management

Feed Water Heaters

By ROBERT JUNE, M. E.

WHAT does a feed water heater accomplish? If I have not a feed water heater in my plant, would it be profitable to install one? These are questions, the answer to which is of considerable interest to the manager or superintendent of a factory producing its own power.

At its name implies, the feed water heater is an apparatus for increasing the temperature of the feed water before it is admitted to the boiler. Generally speaking, for every 11 to 12 degrees the feed water is heated, there is a gain in heat of one percent and a corresponding saving of coal, provided the heat which warms the feed water would otherwise be wasted. The fuel saving effected by preheating feed water is shown in Table I. It will be noted that the savings effected range from 1 to 15 percent, with 7 to 12 percent as the most probable amounts to be effected in practice. The table has been worked for a boiler pressure of 1 lb. as well as for a pressure of 200 lbs., and it will be seen that boiler pressure is a factor of practically no importance in the matter, inasmuch as there is only a difference of ½ percent or less, in savings, with 1 lb. pressure as compared with 200 lbs.

TABLE 1
Fuel Saving Effected by Pre-heating Feed Water
Increase in temperature of feed water.

Degrees								
32 to 212	40 to 212	50 to 212	60 to 212	70 to 212	80 to 212	90 to 212	100 to 212	110 to 212
Percent								
Boiler Pressure 1 lb.								
15.48	14.79	14.08	13.35	12.60	11.83	10.92	10.12	9.32
Boiler Pressure 200 lbs.								
14.94	14.28	13.60	12.75	12.04	11.31	10.56	9.68	8.92
Degrees								
Boiler Pressure								
120 to 212	130 to 212	140 to 212	150 to 212	160 to 212	170 to 212	180 to 212	190 to 212	200 to 212
Percent								
Boiler Pressure 1 lb.								
8.46	7.60	6.72	5.82	4.90	3.96	3.00	2.02	1.02
Boiler Pressure 200 lbs.								
8.10	7.28	6.44	5.58	4.65	3.76	2.85	.97	

Increased Boiler Capacity

The heater does part of the boiler's work. With the same quantity of coal burned, a considerable increase

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of boiler output is assured by heating the feed water, since the latter enters the boiler with a part of its heat supplied. A greater evaporation will take place with the same amount of heat transmitted through the boiler heating surface.

Thus, for example, with an initial temperature of 60 degrees, and a boiler pressure of 120 lbs., the total heat that must be supplied is 1163.6 B. T. U. per lb. of water. If, however, the feed water temperature is raised to 210 degrees, which is an increase of 150 degrees, we find that only 1013.6 B. T. U. per lb. of water is required. This is a difference of 150 B. T. U. which is equivalent to 13 or 14 percent increase in capacity of the boiler with the same amount of fuel.

The feed water heater reduces boiler strains and damage to boiler plates. When cold feed water is precipitated into the boiler, sudden violent strains are almost sure to occur. When the cold water strikes the hot plates, the rivets may become loosened and, as the strains are local, the plates and tubes may be directly injured as well as the joints become loosened. It is almost axiomatic that good service and long service cannot be had from any boiler supplied with cold feed water. The advantages of relieving boilers of the violent strains caused by the admission of cold water are not measurable by the saving in wear and tear, but are nevertheless very marked.

The Economic Utilization of Steam

Efficient and inefficient engines have one characteristic in common; that is, that neither abstracts any large amount of heat from the steam. This is an important point to remember in connection with the possible use of a feed water heater and is a point directly connected with the choice of an engine and the decision as to whether it shall operate condensing or non-condensing.

The answer depends upon what use can be made of the exhaust steam. Thus, if we can use exhaust steam for heating purposes, for drying materials, or in the various plant processes, the steam economy of the engine may not be important, but in preference to installing an expensive and elaborate condensing engine we may find it better economy to put in a low-priced non-condensing engine, using 30 to 40 lbs. of steam per hour and to utilize a part of the exhaust steam for the purpose of pre-heating feed water.

Classification of Heaters

Feed water heaters are generally placed in one of the following classifications:

1—OPEN HEATERS: In which steam and feed water mingle and the condensing gives up its best heat directly to the water.

2—CLOSED HEATERS: In which the steam and water are in separate chambers, and the steam gives up its heat to the water by conduction.

To further classify heaters, they are some times separated according to the pressure of the heating steam, as:

"(a) VACUUM OR PRIMARY: In this type the pressure is less than atmospheric. These are the heaters using an exhaust of condensing engines and are always of the closed type.

"(b) ATMOSPHERIC OR SECONDARY: In this type the pressure is atmospheric, or, to be exact, the

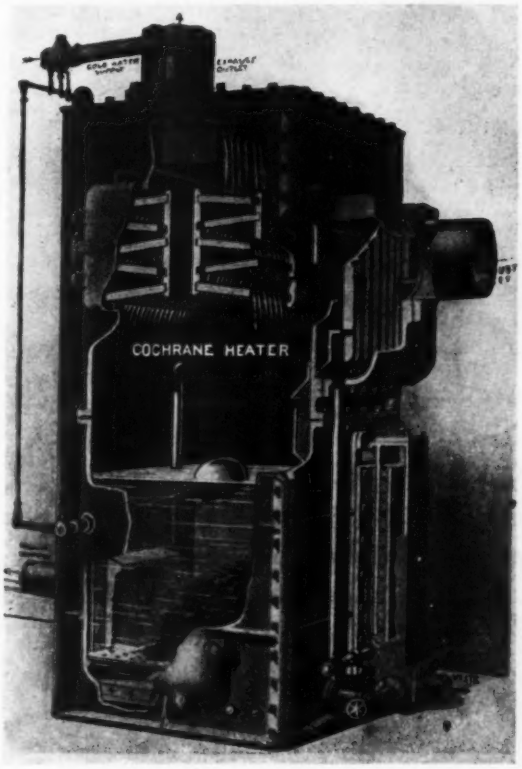

Fig 1—Cochrane Open Feed Water Heater

pressure corresponds to the back pressure on the engine and pumps.

"(c) PRESSURE HEATERS: In this type the pressure corresponds to that in the boiler. These heaters are used primarily for purifying purposes.

Among well-known heaters of the closed type are Wainwright, Wheeler, Otis, National, etc.

Essential Requirements of Open Heaters

The principal objection to the use of the open heater is that the oil in the exhaust steam may reach the boiler; but when the oil separator really takes out the oil, a most serious objection is removed. Therefore, the open heater should have an effective oil separator large enough to form a part of the heater and should be so designed as to eliminate all the oil before the exhaust steam enters the heater. It is not commercially practical to remove the oil or emulsion from water and the filter bed should never be depended upon for this work.

To operate satisfactorily, the oil separator should

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have part areas of ample size and unrestricted passage. It should be self-cleaning.

The water-carrying capacity should be large; in fact, it is what really determines the rating of the open heater. Best results in purifying are assured with a large volume of water, and when there is an ample supply the fluctuations in demand for boiler feed water will cause no trouble and the boiler feed pumps will run smoothly. There should be, at least, a 5-minute supply in the feed water heater, although, of course, local conditions may alter this amount.

The purifying of feed water in an open heater demands that the construction allow an even facility for cleaning. The interior should be accessible without disturbing piping conditions, and possible to renew filter material without breaking a single connection.

The Cochrane, Fig. I, is a typical example of an open heater. Exhaust steam enters the heater through a fluted oil separator, as indicated, and passes out at the top, while the oil drips are automatically drained to waste by the suitable ventilated float. The feed water enters through an automatic valve and is divided over a series of copper trays, so arranged and constructed that the water is forced to fall in a finely divided stream before reaching the reservoir in the bottom. The steam, coming into contact with the water particles, gives up latent heat and condenses. Some of the scale-forming element is deposited on the surface of the trays from which it must be removed. The suspended matter is eliminated by a coke filter in the bottom of the chamber and the floating impurities are decanted by a skimmer or overflow weir. The particular heater shown in the illustration is especially designed for use in a steam heating plant: i. e., besides performing all the functions of an open heater, it provides for the reception and heating of the condensation returned to it from the heating system.

Fig. II shows a section through a Hoppes open heater, illustrating the "Pan" type. Exhaust steam enters at H, passes through oil filter first and surrounds pans T. T. The feed water enters at B, and the rate of flow is regulated by valve F, which is controlled by a suitable float in the lower part of the chamber. Water, in flowing over the sides and bottoms of the pans, comes in direct contact with the steam. The National Heater is illustrated in Fig. III, which shows the oil separator of the same diameter as a shell of the heater, forming its back head.

There is little of special moment which can be said with regard to performance or economy of any particular make of feed water heater as compared with the others. Any open type feed water in which the sizes of openings are properly designed to admit steam and water, and to discharge water, and which has a proper arrangement of perforated trays for breaking up the water for close admixture with the steam, will utilize all of the exhaust steam possible and will increase the temperature of the entering water to a temperature within two to five degrees of the temperature of the steam which is used for heating the water.

There are other possible economies to be obtained from the use of a feed water heater besides that of

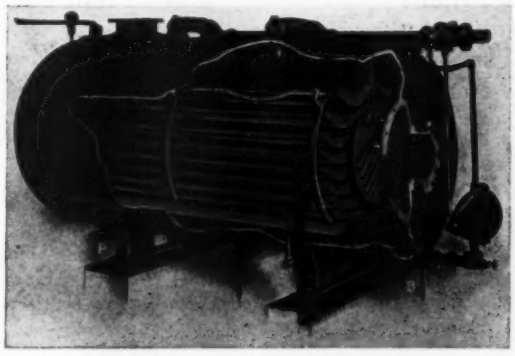

Fig. 2—Hopper Feed Water Heater

heating feed water; such, for instance, as the retaining of solids made insoluble at the temperatures of the hot water within the heater rather than to let these solids go on to the boiler. There are various constructions on the market for which it is claimed that a large quantity of such solids will be retained in the heater, but the truth of the matter is that the largest part of these solids cannot be retained on the heating trays or in the filter section of any of the so-called standard types of heaters. It is necessary to provide a water storage capacity of such volume that the heated water may remain practically motionless for a period of one-half hour to one hour before any real depositing action will be obtained in the feed water heater. Such a construction means a tremendous use of valuable floor space or head room

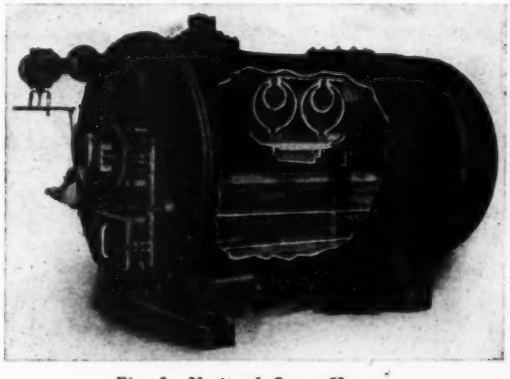

Fig. 3—National Open Heater

in the power plant for the installation of such a storage compartment and is usually not considered economical practice except where the water conditions are unusually bad.

Closed Heaters

What of the closed heater? The essential requirements of the closed heaters are as follows:

1—That they may be easily and thoroughly cleaned.

Strong, rigid frame of T cross section gives large factor of safety
No external pressure applied to top, bottom or sides of housing - impossible to distort or damage bearing
Solid foot cast flat no parting ridge
Threaded steel suspension rod fused solid to cast iron frame
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2—To heat the feed water to the boiling point without causing any back pressure.

3—That they will not foul with scale if properly taken care of.

4—That they will separate and carry off the water of condensation from waste.

5—That they will extract the oil from the exhaust so that the steam can be used for heating purposes and the condensation from the heat coils be returned to the boilers without injuring them.

6—That they will collect and carry off any scum on the surface of the water.

7—That they shall be so constructed that any individual tube can contract and expand independently of the others.

8—That they be made of the best materials and be thoroughly tested before leaving the factory.

The Wainwright, which is not illustrated, is one type of closed heater. The body of the heater is cast iron and the tubes of corrugated copper. The water passes through the tubes and the steam surrounds them. The feed water and exhaust steam do not mingle, and hence the oil in the exhaust does not contaminate the water. Water chambers are divided into several compartments, and the partitions are so arranged that the flow of feed water is directed back and forth through various groups of tubes in succession. This arrangement gives a higher velocity of flow than the non-return of heaters and, therefore, increases the rate of heat absorption. The mud and impurities settle at the bottom and are discharged through the mud blow-off, and such impurities as rise to the surface are removed by the surface blow-off. The tubes are corrugated and allow for expansion and at the same time increase the transmission of heat.

In the National closed heater, which is not illustrated, efficiency in heat transmission is secured by the use of a small curved or coiled tube in increased frequency of contact of the particles of water with the wall of the tube. Even distribution of the water to the tubes is secured by the large manifolds or tube chambers into which the ends of the tube coils are expanded. The tube ends are accessible through their plugged holes on the top of the tube chambers in the large heaters.

One of the most common experiences in connection with the operation of closed heaters is to find them leaking water from the bolted flange joints. Upon inquiry, in such cases, one is invariably informed that it is not always an easy matter to pack the flange, it being a job that must frequently be done on Sunday or at night. In nearly all such cases, it will be found that the leakage is due to the fact that there is no relief valve to take care of the increased water pressure, caused by heat and expansion when the feed water valves are closed. It has been found that the pressure of the water when the feed water valves are closed will, at times, reach a pressure of 500 pounds. In such circumstances, the importance of the relief valve can be really appreciated and it will be found that the use of such a valve will remedy the cause of closed heater leakage.

Open Versus Closed Heaters

Which shall it be, the open or the closed heater? Each type has its advantages, and heaters of both types are made by a number of concerns. A careful study of the particular plant conditions for an intelligent choice is necessary. The following parallel comparison brings out a few of the important factors.

CLOSED HEATERS	OPEN HEATERS
EFFICIENCY	
Feed water may be brought to same temperature as the steam, by employment of sufficient exhaust steam.	Feed water will always be two degrees or more lower than the temperature of the steam.
SCALE AND OIL	
Do not affect the heat transmission.	Will lower the heat transmission.
PRESSURE	
Seldom subjected to more than atmospheric pressure.	exceeds that in the boiler, as it is customary to place closed heaters on pressure side of the pump.
Water pressure slightly	
SAFETY	
Sticking of the back pressure safety valve may cause the open heater to blow up if provision for	relief is not made. Will safely withstand any pressure likely to occur.
PURIFICATION	
Oil in exhaust steam comes in contact with feed water and must be re-	moved. No oil comes in contact with feed water.
REMOVAL OF PRECIPITATE	
Scale and other precipitate readily removed.	tate removed with difficulty.
Scale and other precipi-	
LOCATION	
Must always be placed before the pump suction on the suction side.	May be placed anywhere on the pressure side of the pump.
PUMP	
With supply under suction, two pumps are necessary and one must han-	dle hot water. One cold water pump necessary.

A further advantage for the open heater claimed by manufacturers of this type of equipment is that there is a marked saving in water. Thus, in the open heater, 6 pounds of water and 1 pound of steam combine to make 7 pounds of feed water, but in the closed heater there is no mingling of the steam and water; consequently, 7 pounds of water and 1 1/6 pounds of steam are required to produce the result. That is to say, the closed heater used 14 per cent more water than the open heater. This point may be important in some plants and of no moment in others. Finally, the thing to be emphasized in connection with the prospective purchase of heaters is, first, that such equipment makes for economical operation, and second, that the proper choice of the heaters will depend upon individual conditions.

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Method of Distribution for Power, Rental and Auxiliary Charges in a Paper-Mill

By F. H. SHILAND

IN MOST manufacturing plants there are a number of departments, some of which are actually engaged in productive work, and others which are the so-called non-productive or auxiliary departments. The total cost of running all departments, both productive and auxiliary, for any given period divided by the number of units manufactured gives the manufacturing cost per unit. Where only one kind or grade of product is made continuously, it is not difficult to find the manufacturing cost, but where different productive departments turn out different finished products, it is usually a matter of some guesswork to assign to each productive department its fair share of the cost of running the auxiliary departments.

For instance, if, out of five productive departments, one requires one-half of the time of the machine shop and maintenance department to keep it in running order and the total cost of running those shops is equally divided among the five departments, it is obvious that no true cost of running any one of the productive departments can be reached.

It is the purpose of this article to outline a method for apportioning the proper share of the total manufacturing cost to each productive department. The method will here be applied to a paper-mill, but it can as easily be applied to any other line of manufacture.

The first step is to classify each department as either productive or auxiliary. A productive department may be defined as one directly engaged, at some stage of its manufacture, upon the product which the plant is selling. (In this plan the administrative office is also considered as a productive department.) An auxiliary department is one which supplies one or more of the productive departments or another of the auxiliary departments with the means or materials for production and maintenance.

Table I shows the average number of paper-mill departments classified as either productive or auxiliary.

Let us see how this division of departments works out. The boiler plant furnishes a paper-machine with the necessary power and steam, the beater room supplies the stock which has been delivered from the pulp storage house; the laboratory devotes a part of its time to the inspection of the raw materials and to the approval or rejection of the machine's finished product; the machine and C. & M. shops keep it in repair; the general store-room keeps on hand its wires, felts, belting, twine, wrapping, repair parts, etc. From the pumping plant comes its supply of water. The shipping department receives and delivers its share of the mill's total raw material requirements, often transfers its finished product to the finishing room and finally ships it out, while the administrative office handles the costs and general accounts of the machine. Lockers and toilets, first-aid room, waste-baling room, elevator and fire-protection equipment may also be classified as auxiliaries since in one way or another they all render a service to the paper-machine.

TABLE I

Name of Department	Productive	Auxiliary
Machine No. 1	X	
Machine No. 2	X	
Machine No. 3	X	
Machine No. 4	X	
Machine No. 5	X	
Beater Room		X
Boiler Room		X
Pumping Plant		X
Fire-pump Plant		X
Finishing Department	X	
Machine and C. M. Shops		X
Laboratory and First Aid		X
Baling Room		X
Shipping Department		X
General Stores		X
Pulp Storage		X
Office & Warehouse	X	
Lockers and Toilets		X
Elevator		X

In this plan the beater room has been classified as an auxiliary although it is engaged in a true productive capacity. Where an accurate cost of labor and power for beating different grades of paper can be kept separately, the beater room should be considered as a productive department. That is, beating may be considered as a distinct stage in the process of manufacture and the finished product of the beater room as delivered to the machine room as the raw material for a second stage of manufacture. However, in many mills such separate cost keeping is impossible. In such a case it is best to classify the beater room as an auxiliary and divide its total operating cost among the paper machines in proportion to the tonnage produced by the machines. This will be sufficiently accurate except where a mill is turning out several grades of paper whose times of beating are widely different.

The second step is to determine the factors upon which to base the distribution of the auxiliary department costs among the productive departments. Table II shows the factors which seem to be the most

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Sherman Paper Co	1	Sakai Celluloid Co., Japan	1
District of Columbia Paper Co	1	Brompton Pulp & Paper Co., Canada	1
Tidewater Paper Mills	2 re-orders	New York & Pennsylvania Co	1
Abitibi Power and Paper Co., Canada	7 re-orders	Crown Willamette Paper Co	1
Bryant Paper Co	1	Fitzdale Paper Co	2 re-orders
King Paper Co	1	Spanish River Pulp & Paper Co., Canada	1
Laurentide Paper Co., Canada	7 re-orders	Belgo-Canadian Pulp & Paper Co., Canada	2 re-orders
Finch Pruyn Co	1	St. Croix Paper Co., Canada	1
Wheelwright Paper Co	1	Fitchburg Paper Co	1
Wausau Sulphate Fibre Co	3 re-orders	Ontario Paper Co., Canada	1
Price Brothers, Ltd., Canada	2 re-orders		

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logical and the most easily obtained for each case.

The third step is to determine the proper percentage of the cost of each auxiliary department which each productive department should carry. These are based on the factors as given in Table II. In Table III are shown the percentages which will be used in this article.

TABLE II.

Item	Auxiliary Dept.	Basis for Distribution to Productive Depts.
1	Machine and C. & M. Shops	Number of hours spent in productive departments over a long enough time to give a good average.
2	Pumping Plant	Amount of water delivered to productive departments and to other auxiliary departments.
3	Sprinkler and Fire Protection	Floor area occupied by productive and other auxiliary departments.
4	Laboratory and First Aid	Average hours given to productive and other auxiliary departments.
5	Baling Room	Tonnage received from departments.
6	Shipping Dept.	Tonnage handled for departments.
7	Beater Room	Tonnage produced by paper machines.
8	General Stores	Tonnage delivered to departments
9	Pulp Storage	Tonnage produced by machines.
10	Boiler Plant	Pounds of steam delivered.
11	Purchased Power.	Power consumed by departments.
12	Lockers & Toilets.	Number of employees per department.
13	Elevator	Average number of deliveries or calls at departments.

Item 3 in Table II includes not only sprinkler equipment but also fire pump, tanks, hose lines, etc., so that while some parts of the plant may be unsprinklered, it is fair to distribute the value of the entire equipment over the entire area of the plant on the basis of floor space occupied by each department.

It might be well to call attention here to the fact that some departments occupy space on more than one floor. For instance, a paper machine should be charged not only with the space the machine itself occupies on the machine floor (including working space) but also with the space taken up in the basement by its drive, pumps, chests, etc. The space charged to the pumping plant should include that occupied by the pumps, settling basins, filters and filtered water reservoirs. Heating and drying steam should be included as well as steam for power in calculating the total used by a department. Likewise, current for lighting must not be forgotten when considering the electric power used by a department.

Having fixed our basis for distribution as in Table II and determined out percentages as in Table III, the final step is to apply this information to the actual quantities involved and make the actual distribution in the proper order.

As an example, we will take first the matter of purchased power. Table IV, with the accompanying explanations, will show the method used.

The first column of figures gives the amount of power consumed by each department, whether productive or auxiliary. The following ten columns are used for assigning or distributing to each of the seven productive departments its share of all the purchased power used by the auxiliary departments.

Since the boiler plant is not served by any other auxiliary that uses steam, it will be the first to be distributed. From Table III we see that No. 1 machine takes 6% of the output of the boiler plant. Hence, it should be charged with 6% of the electric power used by the boiler plant or 0.6x227 which amounts to 14 HP hours. In the same way, all the other departments using steam are assigned their share.

In the next column the electric power used by the elevator is assigned to the departments using it.

In the next or fourth column of figures, the Machine and Construction & Maintenance Shops are distributed. Note that in addition to the 284 HP hours used directly by the shops, there have been added in the previous distributions 4 HP hours as their share of the boiler plant current consumption and 11 HP hours from the elevator. Hence, we have now a total of 299 HP hours to be distributed to the departments using these shops.

In the last two columns the amounts of direct and assigned power are totaled and the corresponding percentage of the total power used by the mill computed. We find, for instance, that machine No. 1 must be charged with 13.06% of the electric power bill, and, with the method used, we can be assured that this is its fair share, the accuracy of the percentage being limited only by the correctness of the percentages assigned in Table III.

In working out this table as well as the two following, great care must be given to the order in

TABLE III.

Department—	Paper Machines 1	3	3	4	5	Beater Room	Finishing	Boiler Room	Pumping Plant	Machine Shop	C. & M. Shops	Lab. & 1st Aid	Baling Room	Shipping	Gen. Stores	Pulp Storage	Lockers—Toilets	Elevator	Office—Whse.
Machine and C. & M. Shops...	16%	16%	16%	16%	16%	5%	15%	..	..	..	..	..	..	..	..	..	..	..	..
Pumping Plant.....	14	14	16	16	40	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sprinkler Equipment.....	2	2	3	4	7	11	20	3	3	2	2	1	1	3	7	16	1	..	12
Laboratory & First-Aid.....	10	10	10	10	10	..	50	..	..	..	..	..	..	..	..	..	..	..	..
Beater Room.....	9	9	14	31	37	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Baling Room.....	..	..	..	..	..	..	100	..	..	..	..	..	..	..	..	..	..	..	..
Shipping	3	3	6	12	13	..	63	..	..	..	..	..	..	..	..	..	..	..	..
General Stores.....	6	6	6	6	6	..	70	..	..	..	..	..	..	..	..	..	..	..	..
Pulp Stores.....	9	9	14	31	37	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lockers & Toilets.....	1	1	1	2	2	20	29	2	1	2	3	1	1	2	1	1	..	..	30
Elevator	..	..	..	..	..	..	20	..	..	6	5	..	..	..	70	..	..	..	..
Boiler Plant	6	6	11	17	29	9	12	..	..	1	1	1	..	..	1	..	..	..	6
Purchased Power.....	8	8	6	12	11	40	3	1	8	1	¼	⅛	¼	⅛	⅛	⅛	..	⅛	⅛

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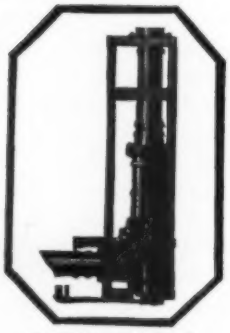

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which the assignments are made. Referring to Table IV, suppose that the machine and C & M shops or the General Stores had been distributed before the elevator. Then, later, when an attempt was made to distribute the Elevator, it would be found that two of the three departments it served had already been distributed, and it would be a very difficult matter to attempt an accurate distribution.

To avoid such a difficulty, the following rule should be observed: "Distribute no auxiliary department until it has absorbed its share of every other auxiliary that serves it."

Table V shows the distribution of steam power and Table VI the distribution of floor area, the method used being the same as outlined for Table IV.

The working up Table VI involves no difficulties

TABLE IV

Department	HP Hrs. Consumed Directly	HP Hrs. as Share of: Boiler Plant	Elevator	Machine & C & M Shops	Pumping Plant	Beater Room	Lab. and First Aid	Baling Room	Shipping Dept.	General Stores	Pulp Stores	Total HP Hrs. Direct and Assigned	Per cent of Power Bill to be Charged to Productive Dept.
Machine 1	1816	14	..	48	254	820	3.4	..	3⅜	6.6	2.5	2965¼	13.06%
Machine 2	1816	14	..	48	254	820	3.4	..	3⅜	6.6	2.5	2965¼	13.06%
Machine 3	1362	25	..	48	290	1276	3.4	..	1½	6.6	4.0	3016½	13.29%
Machine 4	2724	39	..	48	290	2826	3.4	..	3	6.6	9.0	5949	26.21%
Machine 5	2497	66	..	48	728	3373	3.4	..	4	6.6	10	6736	29.67%
Beater Room	9080	20	..	15	...	....	...	..	...	...	...	.....	.....
Boiler Room	227	..	..	..	...	....	...	..	...	...	...	.....	.....
Pumping	1816	..	..	..	...	....	...	..	...	...	...	.....	.....
Finishing	681	27	23	44	...	....	13	57	18	77	...	940	4.14%
Machine and C & M Shops	284	4	11	..	...	....	...	..	...	...	...	.....	.....
Laboratory & First Aid	28	2	..	..	...	....	...	..	...	...	...	.....	.....
Baling Room	57	..	..	..	...	....	...	..	...	...	...	.....	.....
Shipping	28	..	..	..	...	....	...	..	...	...	...	.....	.....
General Stores	28	2	80	..	...	....	...	..	...	...	...	.....	.....
Pulp Stores	28	..	..	..	...	....	...	..	...	...	...	.....	.....
Office and Warehouse	114	14	..	..	...	....	...	..	..	..	...	128	0.57%
Elevator	114	..	..	..	...	....	...	..	...	...	...	.....	.....
Total	22700											22700	100.00%

TABLE V

	Pounds Steam Directly Used	Additional as Share of: Boiler Plant	Machine and C & M Shops	Beater Room	Laboratory and First Aid	General Stores	Pulp Stores	Total Consumption	Per cent of Output of Power Plant
Machine 1	1650	90	52.8	202.6	16.5	9.9	13.5	2035.3	7.97%
Machine 2	1650	90	52.8	202.6	16.5	9.9	13.5	2035.3	7.97%
Machine 3	2450	165	52.8	315.2	16.5	9.9	21.0	3030.4	11.86%
Machine 4	4150	255	52.8	698.0	16.5	9.9	46.5	5228.7	20.46%
Machine 5	6850	435	52.8	833.1	16.5	9.9	55.5	8252.8	32.30%
Beater Room	2100	135	16.5	....	...	...	...	.....	....
Boiler Plant	1500	...	...	....	...	...	...	.....	....
Pumping	None	...	...	....	...	...	...	.....	....
Finishing	2950	180	49.5	....	82.5	115.5	...	3377.5	13.22%
Machine and C & M Shops	300	30	...	....	...	...	...	.....	....
Laboratory and First Aid	150	15	...	....	...	...	...	.....	....
Baling Room	None	...	...	....	...	...	...	.....	....
Shipping	None	...	...	....	...	...	...	.....	....
General Stores	150	15	...	....	...	...	...	.....	....
Pulp Stores	150	...	...	....	...	...	...	.....	....
Office and Warehouse	1500	90	...	....	...	...	...	.....	....
Elevator	None	...	...	....	...	...	...	.....	....
Totals	25550							25550	100.00%

TABLE VI.

	Sq. Ft. Area Directly Occupied	Sq. Ft. Area Share of: Fire Pump	Lockers and Toilets	Boiler Plant	Machine and C & M Shops	Laboratory and First Aid	Beater Room	Pulp Storage	Pumping Plant	Shipping Dept.	General Stores	Baling Room	Total Area	Per cent of Area of Mill
Machine 1	5000	28	31	358	1168	60½	2243	3151	790	188	904	0	13921½	6.8
Machine 2	5000	28	31	358	1168	60½	2243	3151	790	188	904	0	13921½	6.8
Machine 3	7450	42	31	358	1168	60½	2489	4902	903	375	904	0	19980½	9.6
Machine 4	7550	56	62	1015	1168	60½	7726	10855	903	750	904	0	31049½	15.10
Machine 5	15680	98	62	1731	1168	60½	9222	12956	2257	813	904	0	44951½	21.8
Beater Room	23250	154	617	537	365	0	....	....	...	...	...	...	.....	....
Boiler Plant	5865	42	62	....	....	....	....	....	...	...	...	...	.....	....
Pumping Plant	5570	42	31	0	0	0	0	0	...	...	...	...	.....	....
Fire Pump	1400	...	...	...	...	....	....	....	...	...	...	...	.....	....
Finishing	33770	280	896	716	1095	302½	0	0	0	3940	10549	1070	52618½	25.5
Machine and C & M Shops	6970	56	154	120	....	....	....	....	...	...	...	...	.....	....
Laboratory and First Aid	500	14	31	60	0	....	....	....	...	...	...	...	.....	....
Baling Room	1025	14	31	0	0	0	0	0	0	0	0	...	.....	....
Shipping	6150	42	62	0	0	0	0	0	0	...	...	...	.....	....
General Stores	14880	98	31	60	0	0	0	0	0	0	...	...	.....	....
Pulp Stores	34760	224	31	0	0	0	0	....	...	...	...	...	.....	....
Office and Warehouse	28250	168	926	358	0	0	0	0	0	0	0	...	29702	14.4
Lockers and Toilets	3075	14	...	...	....	....	....	....	...	...	...	...	.....	....
Total	206145												206145	100.0

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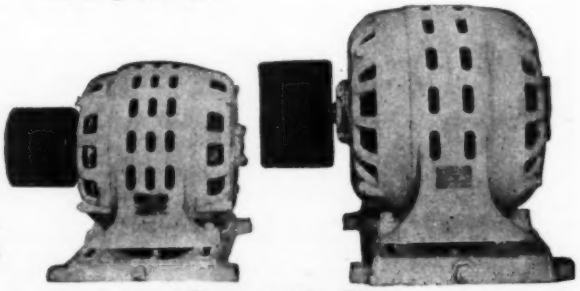

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beyond the actual measurement of floor area, a fair assignment among the departments and a reasonable close accounting for the total area of the plant. The space set apart for aisles may be assigned to the departments making most use of them.

The method outlined here will materially assist the cost or accounting department in assigning to each productive department its fair share of the total cost of running the plant, and therefore quickly reaching the true cost per unit of the product. Provided no changes are made in floor area or power requirements, accurate estimates of future costs can be made up, not only for the regular product put out but also for any new product which the plant may contemplate putting out. Should changes in floor space or power requirements be necessary the percentages affected may be adjusted without difficulty.

The distribution of costs will be made on a systematic basis and, once the factors and percentages are determined upon, will not be affected by the personal and more less inaccurate opinions of individuals.

Another frequent question, easily answered under this plan, is the effect of added equipment to the unit cost in any productive department. Suppose an addition to the pulp storage is needed. Reference to Table III shows that the five paper machines are the only productive departments affected and that 37% of the carrying charges of the new addition must be borne by No. 5 machine. The effect of the added charge can be calculated immediately. If the present production cannot absorb the charge, the needed increase can be figured, or a change of grade of paper can be made by transferring from another machine.

Many other questions of the proper distribution of overhead charges can be solved by the use of this plan, and it will prove to be of much value in any plant.

Elimination of Groundwood Mill Waste

BY RALPH K. PRATT

THE elimination and utilization of groundwood mill waste is ordinarily viewed as an economic problem of the manufacturing process and they are carried on only as far as they will show a profit. The waste not eliminated or utilized is ordinarily most cheaply disposed of by sluicing into the adjacent stream. If it is desired not to soil the stream with this waste, then the difficult problem of its disposal in other ways presents itself. Progressive mills are solving the first problem to varying degrees of perfection. As far as the writer knows, no complete solution of the latter problem has been attempted. Any attempt to solve it now must therefore be considered experimental.

To make the discussion concrete, a brief description of the pulp mill under consideration will be helpful. The mill is located about four miles from tidewater where a 103 ft. head is at present developed. The river below the mill is valuable as a fish breeding place, which makes it desirable to consider the possibility of not spoiling it by mill waste being present in the water and deposited on the bottom.

Logs are driven down the river to the sawmill in which the pulpwood preparing plant is located. The plant consists of a steam-lift cut-off saw, a barking drum 10x36 ft. in three sections, of the channel-bar slat type of construction, mounted on rollers, gear driven, and a disc knife barker. The prepared wood is conveyed several hundred feet to a pulp mill by a water sluice which dumps into a storage pond. The wood is sluiced from the pond to the grinder platforms.

The mill equipment consists of eight Union Iron Works three-pocket 54″x28″ grinders direct connected to a 5000 h.p. Canadian Allis Chalmers Co. turbine. Wood rack bars ¾″ wide, ¾″ spaces, precede two Sherbrooke knotters with ⅜″ perforations. Four Sherbrooke centrifugal screens are arranged in parallel, the accepted stock going to seven Sherbrooke wet machines with 36″x86″ moulds. The tailings from the centrifugal screens go thru a Sherbrooke knotter with ⅛″ and $\frac{3}{32}$″ perforations. The wet machine laps are conveyed to the press room equipped with five Hydraulic Machinery Co. hydraulic presses and two baling presses.

The various points where waste occur in the groundwood process will be briefly described. Present methods of use and disposal will be mentioned, and some suggestions and recommendations made as to their application to this mill. Further problem of disposal without soiling the stream will be discussed and some suggestions made.

Considering the mill described, refuse and waste occur as follows:

		Est. Amt. of Loss
1.	Sawdust from cutting up saw	1 %
2.	Butts from end of logs	3½%
3.	Refuse from barking drum	5 %
4.	Cull wood	
5.	Shavings from knife barker	10 %
6.	Large chips and slivers from grinders and racks	½%
7.	Slivers from knotter screens	¼%
8.	Tailings from screening system	7 %
9.	Pulp in circulating water wasted	3½%
10.	Pulp in press-roll water and lost under machine felts	1½%

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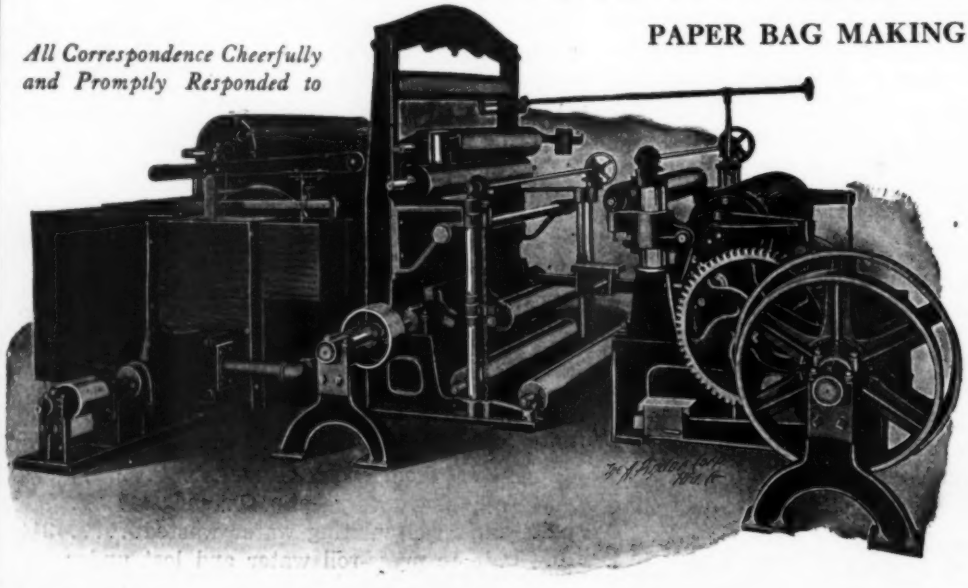

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11. Leakage and floor waste..... Small
12. Broken and dirty laps and scraps from conveying and pressing system..... Small

Above Items Taken Up In Detail

(1) To save on amount of sawdust made, some mills use band saws for cutting up. The use of long wood also makes a saving of sawdust. If this mill cut wood a full 24″ or 24½″, instead of 21″ or 22″ a cut might be saved on some logs. The grinder pockets are 25½″ long. Sawdust is usually used for fuel or sold for various purposes.

(2) As far as the writer knows, there is no good reason for cutting 6″ or 8″ butts from logs used for pulp wood. If there is an occasional burned end, a 1″ or 2″ butt might be cut. Less waste would be incurred if burned ends were cleaned on the knife barker. If butts are cut, they can, of course, be used for fuel.

(3) Barking-drum refuse, when water is used in the drum is conveyed or sluiced to a dumping ground or is run through a bark press and burned. A few mills have claimed to derive some fuel value from the pressed refuse, but ordinarily one is satisfied if the refuse can be pressed dry enough to burn without the use of additional fuel. Many drums are operated without water. It seems entirely possible that this drum might be operated without water and the refuse be burned under the boiler as it comes from the drum. Refuse would be thoroughly washed from the wood not knife barked in the trough and pond.

(4) Cull wood is ordinarily used as fuel, unless it can be made into lowgrade pulp.

(5) If it is necessary to use knife barkers to obtain the degree of cleanliness desired, the only way to reduce the waste is to carefully operate and supervise the barkers. The shavings are burned as here.

(6 and 7) Coarse slivers are usually sluiced to the river. However, it is possible at some additional expense to collect them. They could be burned with perhaps a small additional amount of fuel.

(8) The tailings from the screening system is where one of the large losses occurs in a mill which does not have a board or wrapping machine to utilize them. This use can only be made in a large mill. It is difficult to run well screened groundwood slivers on a wet machine and there is not even as steady a market for them as for No. 1 pulp. The first step in disposing of these tailings is to arrange the screening system so that all the usable pulp is removed and nothing but clean slivers discharged from the system. If it was desired not to put the slivers in the river, the water could be removed in drainer tanks or by press rolls. These slivers and the coarse slivers could then be burned with probably a small amount of the cull wood. The water removed will be small in amount and practically clear.

Sliver refiners are, of course, to be considered in connection with the reduction of this waste. Some mills claim to be operating closed system with the use of refiners. The writer has seen only one or two mills which, were operating a satisfactory closed system. One was running a closed system using the Voith Refiner. Another was operating a closed system using a Jordan Engine. Another operated a closed system for a time using four Jonassen Refiners (Rice, Barton & Fales) and a Jordan but had to discontinue it. Representatives of another mill told the writer they were operating a closed system with a Howard Refiner. The writer believes groundwood sliver refining to still be in an experimental stage and does not recommend its attempt here for two or three years.

For clean screening the following changes are recommended here: Replace the present fine racks with a ¾″ perforated plate and power driven scrapers use ¼″ perforated plates in knotters. Arrange the fine screens in two stages, that is, pump the tailings from the first screens to a second screen, the acceptances from all going to the wet machines. No additional screens required, simply a small pump and drive for it. Try $\frac{3}{16}$″ perforated plates in the knotter now used as a tailings screen. The tailings from the second screen would go to this latter machine.

It is of course possible to screen clean with the present screen arrangement if the stock is delivered thin enough to the screens, and enough wet machines are run to remove the water after the pulp is screened. It is generally considered that less objectionable material will be accepted by the screens, if the pulp is screened at higher consistency in several stages, than if it is screened in one stage at lower consistency. The former method is much more economical of wet machines and decker capacity.

(9) The elimination of white water waste consists simply in using over and over again the water used to grind the pulp and circulate it through the screening system and to the wet machines. As 250 to 400 pounds of water per pound of pulp depending on consistency, are used to convey the pulp to the wet machine vat and only from 12 to 18 pounds per pound of pulp are removed at the couch roll, it is evident that very little fresh water can be added to the circulating system. Leakage from grinder cylinders, especially when one on each pair is always up, the water from the hose used for cleaning cylinder wires will make up a portion of the water leaving at the couch roll.

Many mill men believe that there is one or more places in a pulp mill where fresh water must be used in the circulating system but a comparison of different mills will show that white water can be used thruout a groundwood circulating system and many mills do use it throughout. This use would eliminate the white water waste if conditions could be kept always uniform. But due to changing conditions, more circulating water is required at one time than another, and these fluctuations are usually beyond

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ordinary storage capacity to take care of, and there will be some waste at times when it is necessary to decrease temporarily the amount of water in circulation. This surplus is usually run through save-all cylinders, which recover part of the pulp in it. Settling tanks are sometimes used ahead of the save-alls.

To apply white water waste elimination to this mill, it is recommended that it be arranged so that it is convenient to use only white water in grinder pits first. Then arrange to use white water from the centrifugal white water pump in the shower pipes in knotters and tailing screen. Use the triplexpump now piped for white water to furnish the necessary pressure water for use in the fine screen nozzles. Discontinue the regular use of fresh water showers on the cylinder wires. It must be borne in mind that white water shower pipes will plug much quicker than fresh water pipes and provision must be made for quickly and easily cleaning all shower pipes. Larger holes should be used in the white water shower pipes than in fresh water showers.

(10) Under each wet machine felt is a tray which catches the water used in cleaning the felt, portions of the sheet of pulp which are not picked up by the upper press roll but follow the felt down, the water squeezed out by the press rolls, the water used for cooling the press roll bearings. All of this goes to the river by a system of pipes and spouts. Much of the pulp in this water can be saved by running the water through one or more save-all cylinders. The best save-all is a simple decker (a cylinder mould and couch roll) running at slow speed.

(11 and 12) Reduction in these wastes is effected by careful operation, maintenance and supervision. Clean scraps may be beaten up and run through system again.

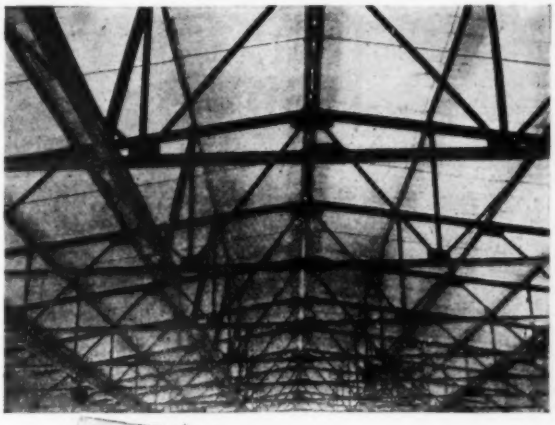
This leaves the water from the save-alls to be disposed of. It is doubtful if this water could be successfully used over again in the felt cleaning shower system. The writer does not know of its even being attempted. However, it is possible that if the save-all system was of ample capacity with at least one spare cylinder, it could be maintained in good enough condition and operated so that the water discharged from it would not contain enough material to be objectionable in the river. If it is objectionable the writer believes the solution of the disposal of the waste water here is to sluice it to the sea in a V-shaped board sluice.

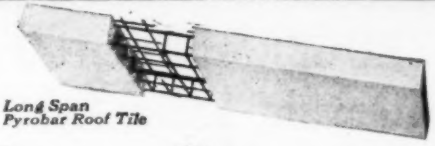
Conclusion

A summary of the suggestions made is as follows:

First: For more economical operation, cut as many 24″ blocks from each log as possible up to the last piece which should be cut in two approximately equal pieces, each not less than 12″ nor more than 25″. No butts to be cut which are too short to grind.

Investigate to see if more wood than necessary is knife barked.





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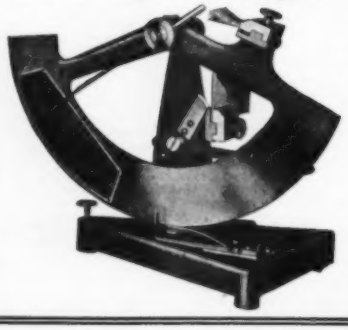

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Rearrange screening system as outlined.

Use white water throughout the stock circulating system.

Install decker save-alls to save pulp in water from felts of wet machines and surplus circulating water due to fluctuating conditions.

Second: To avoid soiling the river, try running the barking drum without water and burn the waste under the boiler.

Collect and burn bull screen and knotter screen tailings.

Install drainer tanks or press rolls to remove water from fine screen tailings and burn these tailings.

Increase the save-all equipment and make it and the white water system as reliable as the rest of the mill to avoid shut downs.

If the water from save-all system is objectionable in the river, sluice it to the sea. The screen tailings could then go with the waste water.

In addition to the above, there should be mentioned emergency overflows and wash-ups. The loss from these is almost negligible in reasonably careful operation. The river soiling due to them might however be objectionable. The periods of duration being short and widely separated, the average quantity of water would be very small. These two sources of pulp carrying water could be taken care of by a settling tank, of such proportions as could be built west of the mill or the mill property, say from 3,000 to 5,000 cu. ft. capacity. It could be flushed out twice a year during high water.

Fractions and Decimals

THERE is a difference between decimals and fractions, as everybody should know: .005 inch means 5/1,000 inch, and .0005 inch means 5/10,000 inch, or one-half of one one-thousandth—a term that is very much used nowadays. Yet, there seems to be a tendency on foot to confuse the simplicity of decimals and make a deplorable combination of the two, like this—.000½ inch.

What does .000½ inch represent? A half of a thousandth or a half of a ten-thousandth? I don't know.

Although those who write such expressions claim that it means a half a thousandth, I rigidly maintain that it means nothing. There is no such animal. There is no excuse for bawling our mathematics up in such a way as that and the habit should be stopped before too many catch it.

If a half of one-thousandth inch is to be written it should be written in this way:

.0005 in., 1/2,000 in., or ½x1/1,000 in., or 0.5/1,000 in.

All of these are in perfect accord with mathematical practice and there is no question as to their meaning. Why use a questionable method?

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High Lights on the News Print Situation

By R. S. KELLOGG
Secretary-Treasurer, News Print Service Bureau

THE fact that news print paper is a commodity of remarkably steady consumption in the United States—perhaps even more so than sugar and salt—is once more evident from the latest statistics on the subject.

It is but repeating what is now a well known statement to say that the consumption of standard news print paper—and this is 93 per cent of the total output of news print—increased only 5 per cent in 1920 over 1919, when a new high record was hung up, but it is not so generally realized that the consumption in 1921—a year of general business depression—was but 2 per cent below that of the boom year 1920 and actually 3 per cent more than in 1919.

Economists and statisticians have long known that in a freely competitive market, 5 per cent under or over supply of a commodity will bull or bear the price, and this principle was strikingly illustrated in the news print trade of these two years. In 1920, the small increase in total consumption led to a fear of shortage on the part of many publishers and the price on the open market was bid up to previously unheard of levels—yet when the year closed, and there was opportunity calmly to cast up accounts, it was found that production had increased 10 per cent over the previous year, that consumption was 5 per cent more than in 1919, and that newspaper publishers had finished 1920 with 50 per cent more paper on hand and in transit than they had at the first of the year. So much for illustration No. 1.

In 1921 we got illustration No. 2. Consumption decreased but 2 per cent from the high point reached the previous year, everybody talked about over-supply and held off from buying, the open market price came down precipitately, and publishers finished with 17 per cent less paper on hand and in transit than they started in with.

The failure to understand and act upon known figures and discernible tendencies cost producers and users most dearly. The publishers paid inflated prices for tonnage beyond their contracts which were reflected through corresponding rises in the constituent raw materials; the manufacturers made large additions to productive capacity at the time of highest construction costs and these new machines were ready to run when the greatest need for them was passed. An already bad situation was aggravated by the continual offering and delivery in our markets of overseas paper at prices which in some cases went far below the American cost of production.

So much for 1920 and 1921. What of 1922?

The high lights available at this time indicate that the pendulum is on the return swing—that consumption of stardard news print in the United States this year will be more than last year and probably equal the total reached in 1920. The man who prophesies is likely to go wrong, but the facts at this writing are:

Newspaper circulation is greater than ever before in history.

For the last twelve months the larger papers have averaged more pages per issue than during the preceding twelve months.

Newspaper advertising in the larger papers (and they consume over 90 per cent of the total) fell off relatively little in 1921 and the curves which went sharply downward in November, December, January, 1919 and 1920, have held almost level during the past three months.

Stocks in the hands of manufacturers are only normal, and in the hands of publishers less than normal.

A low price on the American product and an increase of domestic consumption in Europe will gradually reduce the overseas importations.

The general business situation in America is unquestionably on the mend, the period of liquidation has largely run its course.

With lower operating costs attained or in sight and a better demand for the domestic product, the news print manufacturer should fare better in 1922 than he did in 1921.

Reduced fare for A. P. & P. A. Meeting

Arrangements have been made by the American Paper and Pulp Association whereby those attending the meetings at New York the week of April 10, will be able to secure a reduced rate, along with their wives or members of their family, and will consist of a rate of one and one-half fare for round trip.

In order to secure this reduced rate, however, it will be necessary to secure the standard form of certificate from the agent from whom the original ticket is purchased. These certificates will then be signed by an officer of the Association and when validated by a representative of the railroad, will be accepted for half of the return fare, thus making a saving of 25% on the round trip rate. This rate has been definitely authorized by the Trunk Lines Association, New England, Central, Western, Southwestern, Southeastern and Canadian Passengers Associations.

A. P. P. A. Convention Program

MONDAY, APRIL 10, 1922.

Annual meeting, Technical Association; meetings of Executive Committee and Standing Committees.

TUESDAY, APRIL 11, 1922.

10:00 A. M.—Glassine & Greaseproof Mfrs. Assn., Waldorf-Astoria.
10:00 A. M.—Book Paper Mfrs. Assn., Waldorf-Astoria.
10:30 A. M.—Salesmen's Assn. of the Paper Industry, Waldorf-Astoria.
2:00 P. M.—Cover Paper Mfrs. Assn.
2:00 P. M.—Pulp Mfrs. Assn.
2:00 P. M.—Vegetable Parchment Mfrs. Assn., Waldorf-Astoria.
2:00 P. M.—Salesmen's Assn. of the Paper Industry, Waldorf-Astoria.
3:00 P. M.—Gummed Paper Mfrs. Assn.
7:00 P. M.—Annual Banquet, Salesmen's Assn., Waldorf-Astoria.

Annual meeting, Technical Association; First General Session; Reports of Officers and Committees.

The Woodlands Section will have a forenoon and afternoon meeting, as well as a buffet luncheon.

WEDNESDAY, APRIL 12, 1922.

10:00 A. M.—Waxed Paper Mfrs. Assn., Waldorf-Astoria.
10:00 A. M.—Writing Paper Mfrs. Assn., Waldorf-Astoria.
10:00 A. M.—Cardboard Mfrs. Assn.
10:00 A. M.—Cost Assn. Open House.
2:00 P. M.—Sulphite Bond Division, Waldorf-Astoria.
2:00 P. M.—Glazed and Fancy Paper Mfrs. Assn.

National Paper Trade Assn. meetings and Banquet, Waldorf-Astoria.

Annual Meeting, Technical Association; Second General Session; Discussion of committee reports and special papers; Election of officers; Continuation of papers and discussions.

THURSDAY, APRIL 13, 1922.

10:30 A. M.—Annual Meeting, American Paper & Pulp Assn., Waldorf-Astoria.
2:00 P. M.—Annual Meeting, American Paper & Pulp Assn., Waldorf-Astoria.
7:00 P. M.—Annual Banquet, American Paper & Pulp Assn., Waldorf-Astoria.

Annual Meeting, Technical Assn.; Completion of Program.
Binder Board Mfrs. Assn., Luncheon Meeting.

FRIDAY, APRIL 14, 1922.

11:00 A. M.—Toilet Paper Converters Assn., Hotel Astor.
2:30 P. M.—Tissue Paper Mfrs. Assn., Hotel Astor.
6:00 P. M.—Tissue Paper Mfrs. and Toilet Paper Converters Assn. Annual Dinner, Hotel Astor.

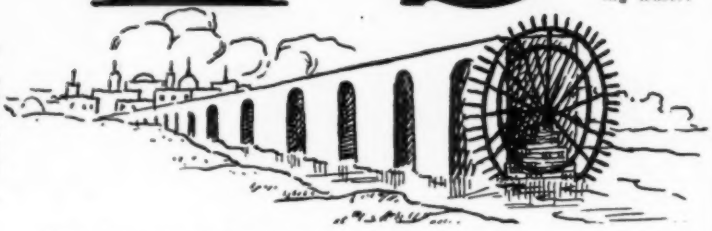
Mr. Alfred Frank

Mr. Alfred Frank, vice-president of the Ancram Paper Mills, Ancram, New York, died suddenly on February 2, 1922, at Los Angeles, California, in his 63rd year. Mr. Frank had been connected with the paper industry for many years and was widely known and universally beloved for his rugged uprightness and honesty.

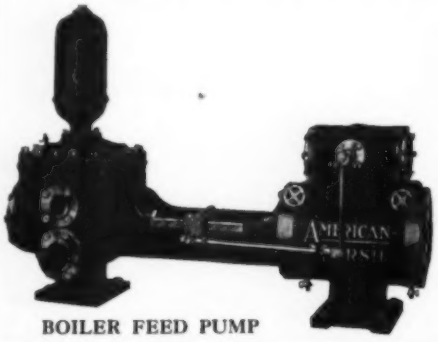
He was president of the Rose and Frank Co., and a director of the Merchants and Shippers Insurance Co., and the Packham Seamless Ring Co. He took a great interest in and was closely associated with many charitable organizations.

PUMPS

The way in which the people of Hama get their drinking water.



THE Syrian City of Hama is known for its large and ancient waterwheels, which supply the city and fields above with water. The wheel illustrated here is one of the largest of its kind in the world. It has a diameter of 70 feet, and is constructed of fine mahogany wood.



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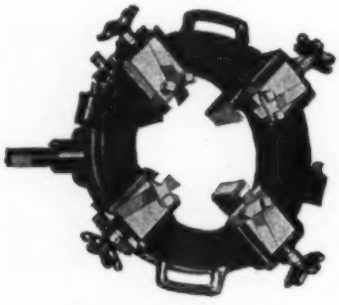
The "TOLEDO" Line of Geared Pipe Tools



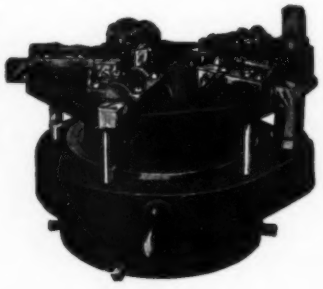
"Toledo" Geared Pipe Cutters

These popular geared cutters have a capacity of 2½" to 6" in one model, and 7" to 10" in the largest model. Fitted with knife cutters. Are portable. Can be split to encircle pipe already installed. Severs pipe quickly leaving clean, square end without burr. One man can operate them with ratchet handle. Their greatest speed and efficiency can be gained by use of our Power Drive.

WHERE fast, accurate, heavy duty pipe threading and cutting must be done, your pipe house can be equipped with no better tools than the famous "Toledo" line. They offer everything to be desired—portability, capacity, ease of operation and durability. Additions or replacements in your pipe tools should not be made until you have fully investigated the complete "Toledo" line. Send for new catalog "F."

"Toledo" Power Drive for Geared Pipe Tools

Used instead of ratchet handle. Attaches and detaches just the same. Operates threaders and cutters five times faster than by hand. Send for bulletin.



"Toledo" Geared Threading Devices

Four models comprise the "Toledo" line of geared Pipe Threading Devices. The combined capacity ranges from 2½" to 12" pipe inclusive. They are conceded by leading pipe fitting contractors to be the most efficient threading devices on the market today. One man can operate any model, including largest size. Are portable. Cut true, clean, accurate threads. Operated with ratchet handle or with "Toledo" Power Drive.

New York Office
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The Toledo Pipe Threading Machine Co. Toledo, Ohio

New England

Boston, March 1, 1922.

Hardly so much activity, speaking in per cent of capacity operation, was noted during February among the New England paper mills. A lull occurred that in several instances, especially among the book paper mills, was the cause of more general curtailment in production than has been necessary since last September. The outlook is not gloomy, for the condition does not seem to be growing worse, and orders, while small, are on the whole satisfactory considering the general state of business.

More specifically the coarse paper mills have fewer and smaller orders for their product than was the case during January. This condition has gradually become more noticeable since the middle of December and is today the cause of the part time operations in one of the largest kraft paper mills of New England, while others feel that their present full time operation may not last a fortnight.

The great bulk of the fine paper mills of New England, excluding from this classification strictly book paper mills, but including the makers of fine writings, ledgers, high grade covers, etc., are operating at not more than 65 per cent of capacity on the general average. The paper board producers with a few exceptions are operating 50 to 60 per cent of capacity.

Chairman Curtis of the Federal Reserve Bank of Boston, viewing the present business status in the New England paper industry said, "manufacturers' stocks are in general slightly higher than a year ago and probably 25 per cent above the average for the past three years." But he added that "paper merchants' stocks are greatly reduced," and, in the coarse paper field generally, "stocks," he said, "are more than 40 per cent lower than a year ago."

Paper mill supplies, generally speaking, have been inactive during recent weeks. Coal is stronger but only to the extent of a few cents per ton, it still being possible to purchase southern coal in the Boston market at $6.25 to $6.50 f. o. b. cars here. Rags, rope, twines and waste papers have declined in this market and show at this writing a very unsatisfactory condition reflecting the lull which has hit this section of the country during the last fortnight. Mixed papers and folded news have sold to board mills at as high as $9 for the former and $13 for the latter. From those prices early in February they quickly dropped to $10.50 and $11 for news and $8 and $8.50 for mixed papers. Book stock was bought quite heavily for a short period about a month ago by Fitchburg mills, but since then demand and price have slumped with the current quotations delivered Fitchburg, Mass., about $1.50. Soft and hard shavings, owing to the firmness in woodpulp, are steadier but they also have declined from highs of $4 on hard whites and $3.40 on soft whites to $3.75 and $3.25, respectively.

White rags are weaker. No. 1 white shirt cuttings are selling in Holyoke at 9c to 9¾c delivered, but on old contracts, for recent business has resulted in new prices at 9c. No. 1 soft unbleached cotton is quoted at 8½c delivered western Massachusetts mills and No. 1 old whites have sold at 5¾c at the mill. Roofing rags are inactive in New England, the quotation being $1.15 to $1.25 per hundred at the mill. Rope is emphatically weak and lifeless. It has been bought at 4c per pound shipping point. The indifferently small amount contracting in pulpwood hereabouts has been at $12 to $14 for rough spruce and fir, in four-foot lengths, point of shipment.

What has been done and what is being done to reduce freight rates, especially on coal and pulpwood, holds the complete attention of paper mill officials in this section of the country. To New England paper mills freight rates are one of the most vital problems, because for one thing they must compete with Canadian mills nearby, which being nearer their pulpwood supplies and enjoying lower freights over their own railroads, are in a position to offer one-sided competition.

At the General Rate Inquiry before the Interstate Commerce Commission at Washington, D. C., early last month, C. H. Tiffany, speaking for the New England Paper and Pulp Traffic Association, and A. H. Campbell, for the International Paper Company, advocated a 10 per cent reduction in rates on pulpwood, especially in the eastern and northeastern district. They asked a reduction to match the reduction made by the Canadian Railroad Commissioners in the rates on eastern Canadian railroads effective December 1st last. Mr. Tiffany said that the effect of the reduction in Canada was that sulphite pulp from Canada could be laid down in Maine for 15 per cent less than the American product could be supplied. The use of foreign pulp, the witness said, caused American

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He must have an instrument that will not only record the amount of paper delivered in feet per minute, but will also show all stops from dry breaks or other causes and the duration of them.

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Write for Bulletin B. B. 62-1

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railroads to lose the revenue that would accrue to them from the carriage of raw materials to the American pulp mills. The result of the maladjustment of rates, Mr. Tiffany said, when added to other factors, was the closing of the pulp mills in the United States. He further stated that rates from the United States into Canada and in the reverse direction should also be brought down and that some international rates on pulpwood were higher than rates on dimension lumber.

Mr. Campbell of the International Paper Company said that freight rates are now enormously higher than the value of the pulpwood at the point of origin.

Activity in the stocks and bonds of Eastern Manufacturing Company, which are listed on the Boston Stock Exchange, have drawn attention to the very favorable condition of these well known Maine fine paper manufacturers. On the paper end Eastern Manufacturing has experienced a marked increase in its business during the past few weeks, for although the plants have been operating at normal capacity since early September, new orders have recently come along at 110 per cent of capacity production. The pulp mills are not so active, yet with operations at 65 per cent the company is showing a profit on the end of the business. Eastern has an advantage in pulp, as its cost to manufacture is substantially lower than that of some of the larger companies. Plant capacity is about equally divided between pulp and paper. Inventories of the Eastern have been marked down to the bone so that the current business is not burdened with the problem of the high cost of raw material, and the recent sale of $2,500,000 7 per cent bonds placed the treasury in a strong position. A very important development is that efficiency of operation has shown a marked improvement. The company is turning out a larger amount of product today with fewer help than at any other time in its history, while improvements in other directions have had the effect of lowering the cost of production. With the exception of the reduction of 20 per cent in wages about a year ago, there has been no further wage cut.

The International Paper Company is made the defendant in a suit for $1,000,000 filed in the Suffolk Superior Court of Boston by the Beacon Oil Company of this city. It is claimed that the paper company failed to comply with a contract to buy a quantity of fuel oil. By the terms of the alleged contract which was dated October 4, 1920, the International Paper Company agreed to buy oil in quantities up to a maximum of 550,000 barrels a year, for a period of ten years. The price agreed upon was $3.50 a barrel. The contract became operative on January 1, 1921. It is claimed that the paper company took only 281,197 barrels. The Oil Company relying on what they allege to be a stipulation in the contract giving them an option of compelling purchase of the full quantity contracted for during any one year, notified the paper company on January last of its intention of shipping the remainder of the 550,000 barrels which the paper company was supposed to take during 1921. The International however is reported to have refused to pay for any shipment made after December 31, 1921.

On or about the middle of March, sailings of the Commercial Maritime Company between Portland, Maine, and New York City and Philadelphia will commence. This company has secured the backing of men interested in maintaining a continuous freight water service between Portland and New York. The paper mills will provide the largest tonnage, and as a differential in freight rates is promised over the all rail rate it will attract many shippers, for letters promising the support of their business have been received at the Company's 88 Broad street, Boston, office from the leading paper mills of Maine. The joint freight rate with the Maine Central Railroad will cut rates to New York and Philadelphia about 8 percent. Paper stock dealers in New York have agreed to use the new service in shipping their Maine mill customers. All in all, it is one of the most important developments in recent years affecting eastern paper mills.

The Oxford Paper Company and the Eastern Manufacturing Company have recently received a favorable decision which includes the awarding of reparation on a disputed coal freight rate problem. The case was submitted to the Interstate Commerce Commission, June 28, 1921. The two paper companies' contention involved the interpretation of an order of the Director General of the Railroads made in 1917 which authorized an increase of 15 cents in the through rate on coal when made in combination. It was not contemplated that the permission to increase rates on bituminous coal would be construed as authorizing a maximum increase of 15 cents in each

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A very marked advantage in the use of the diamond Valv-in-Head soot blower is the increase in effective pressure in the blower element. This is due to two factors. First—the valve offers practically a straight passage to the steam, whereas in other systems the steam must take two right angle turns through the globe valve, which causes an appreciable drop in pressure. Second—the Valv-in-Head system requires about half the quantity of pipe, valves and fittings used with other blowers, and on this account the pressure drop from source of steam to blower element is very much less.

The outstanding advantage of this increase in effective pressure is of course the increase of cleaning efficiency of the steam jets. With increased velocity the range of the steam jets is considerably greater and the boiler is more thoroughly cleaned in all respects.

As boilers are only effectively cleaned when the steam jets play on the tubes for a pre-determined period of time, a third and extremely important factor in insuring greater effectiveness is the use of the Valv-in-Head of reduction gearing which regulates the speed of the blower element so that all tubes are equally and thoroughly cleaned.

Greater cleanliness is only one of eleven important advantages of Diamond Valv-in-Head soot blowers. Why not let us tell you about the others?

Every boiler needs a mechanical soot blower and you will save money by buying the best. Diamond Valv-in-Head blowers are adapted to all types of water tube boilers. On request our Engineer will go over your existing soot blower installation and advise whether it can profitably be replaced with the Diamond Valv-in-Head system. Ask for your copy of Bulletin 297 describing the new blower.

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Books on Paper Manufacture

Subscriptions are being taken for the new Textbooks on the Manufacture of Pulp and Paper of the Joint Committee on Vocational Education of the Pulp and Paper Industry, a complete set of which should be owned by every firm or individual connected with the industry.

The set will be complete in five volumes. Volumes I and II deal with arithmetical operations, elementary mathematics, drawings, etc. Volumes III, IV and V, to be issued shortly, will deal with pulpwoods and their preparation; manufacture of pulp; analytical methods; and paper manufacture in all its aspects.

Volumes I and II are now on sale at $5.00 a volume. In the selection of classroom problems bearing on the principles and practice of pulp and paper manufacture they represent the highest standard in textbook publishing.

Orders, with remittances, will be filled by the Technical Association of the Pulp and Paper Industry, 18 East Forty-first Street, New York.

component of rates made in combination, but that the aggregate rate should be increased by not more than 15 cents. But the roads adding 15 cents for each individual part of the haul doubled and tripled the increase, and the Oxford Paper Company and the Eastern Manufacturing Company contended that the double and triple increases brought about a serious disturbance in the rate relationships in the New England territory. These mills showed moreover that Canadian paper mills enjoyed a lower freight rate on American coal in many instances than American mills in Maine. Their complaint was upheld and the I. C. C. granted them reparation with interest for the damage suffered. Once again paper mills have by vigorous action secured adjudication on freight rates that reacted to the benefit of entire industrial New England.

A case of law involving disputed deliveries on pulpwood came to an abrupt stop in the Court at Bangor, Maine, when one of the jurymen announced in court that he had been approached in regard to the case. It is expected that the case will have a retrial. It has excited considerable interest in New England paper trade circles, particularly in view of the revelations in connection with the high prices charged for pulpwood two years ago, evidence being presented to show that mills paid as high as $42 per cord for spruce and fir. Perley R. Eaton of Rutland, Vermont, is suing Frank S. Sawyer of Jonesport, Maine, for breach of contract in failing to deliver on 5,000 cords of wood which were ordered for the Remington Paper and Power Company of Norfolk, New York.

Bath, Maine, is to become the pulpwood center of the Pejepscot Paper Company, one of the Maine newsprint mills. The company's Belfast plant will be abandoned and its large supply of wood will in the future be brought from the Provinces to Bath. The company's equipment will be either moved to Bath, or new equipment for the handling of the wood will be installed at that point.

Hollingsworth & Whitney are negotiating, according to a reliable report, for the purchase of lumber and pulpwood lands in Albert County, New Bruinswick, and in Cumberland County, Nova Scotia. The present owners are Charles T. White & Son of Sussex, N. B. It is reported that Hollingsworth & Whitney have a large number of men who are looking over the ground. The timberland is valued at $500,000.

The E. B. Draper Company has just been incorporated to take over the extensive business of E. B. Draper of Bangor, Maine. Mr. Draper is one of the leading pulpwood operators of New England as well as a pulp producer at the Nekonegan Paper Company. The incorporation was for the purpose of consolidating the several branches of his business.

The Connecticut River every spring was the scene of a big pulpwood drive which fed the paper mills at Claremont, Bellows Falls, and other mill towns. But this year there will be no log drive, according to General Manager George A. Chedel of the Champlain Realty Company, owing to the large stocks of wood and pulp at the mills.

The Charles H. Hayes Company, paper mill supply dealers, have been incorporated in Boston to do business in this city. Their capital stock is $15,000. The incorporators and directors are Charles H. Hayes, 51 Bowdoin street, Dorchester, Mass.; Saul F. Matthews, vice-president; treasurer, J. L. Guild, and clerk, M. L. Marcus.

Wood pulp is now being shipped from British Columbia to Boston for distribution to New England paper mills. It comes by steamer, via the Panama Canal, the port of loading being Port Alice, B. C. A large tonnage entered Boston recently on the Shipping Board vessel, Knoxville City.

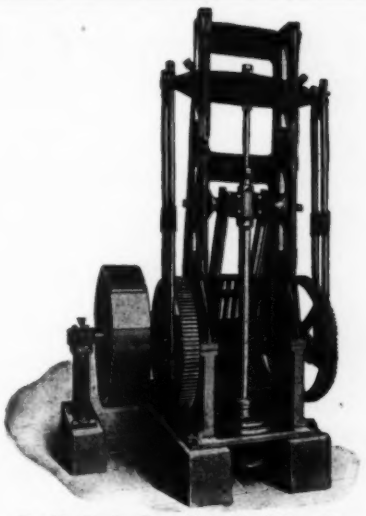
Miami Valley

Dayton, March 1, 1922.

While the jobbers who serve this district refer to their business as spotty, and say that February was far behind January in orders, all of them expect a turn for the better during March.

The roofing, tissue and board mills in the Miami Valley continue to operate to capacity. The roofing mills explain that this is their busiest season, due to the spring building campaign having been well started, or at least planned and contracted for, by this time.

The tissue and board mills, making materials for food con-



Double Stroke Deep Well Head Size 3L, Arranged for Belt Drive.

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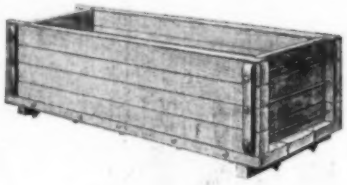

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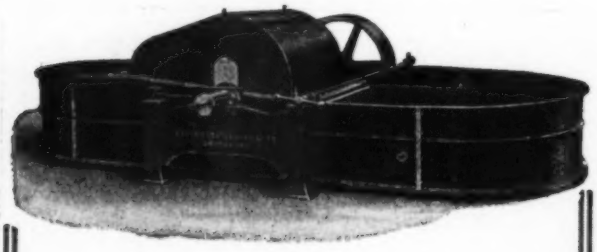
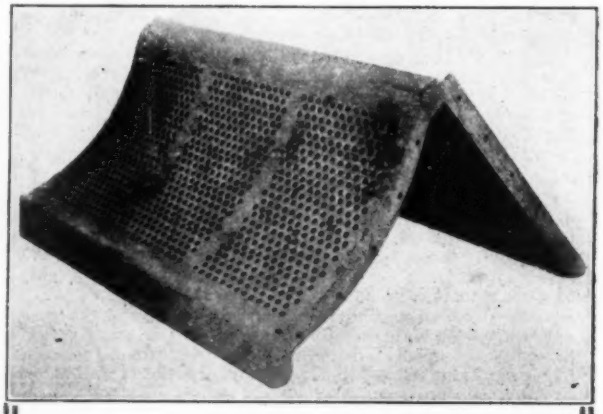


"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO

tainers, naturally feel any slump in the paper market less than the makers of other grades of paper.

It is the makers of fine papers whose mills are only running four and five days a week. In these mills, the report was given out recently that 1921 saw only a 50 per cent operation, and that they expect a demand no greater for this year. Some of the makers of fine writings are down, and while they have two or three weeks' orders on their books, do not show any signs of making this paper.

On the whole, the feeling in the Miami Valley is more easily defined than thirty days ago. Paper manufacturers are advertising very extensively, both in the newspapers and magazines, and in direct by mail campaigns, and there are signs of an aggressive going after business that this territory has not shown for a long time.

The bag factories and the envelope factories are rushed with orders, and the Miami Tablet Company, at West Carrollton has launched a big newspaper advertising campaign.

A much more optimistic feeling is abroad that is bound to show itself in an increased volume of orders.

The Champion Coated Paper Company, at Hamilton, Ohio, which other paper men in the Valley feel is a sort of a barometer, is running nine of their ten machines. The report was given out at this company that last year their production was about 75 per cent of 1920, and that they expect about the same demand this year, which some of the other paper men argue to mean that they can all expect the same demand they had in 1921. A great many of the Miami Valley mills have reported that their 1921 production was 80 per cent of normal, or better, so that if these mills can confidently expect a demand equal to that this year, they will not, at any rate, lose money.

Miami Valley Superintendents Meet

The regular monthly meeting of the Miami Valley Division of the Superintendents' Association was held at the Elks' Club at Middletown, Ohio, on the evening of February 25th. Dinner was served. The hall was supplied for the meeting by Mr. Charles Shartle, of the Shartle Brothers Machine Company, of Middletown, and the superintendents were treated to smokes after the dinner by Homer Martindale, also of the Shartle Brothers Machine Company.

At the last meeting of the Miami Valley Paper Manufacturers' Association, H. P. Carruth, of the Mead Pulp & Paper Company, and Tom Harvey, of the Gardner-Harvey Paper Company, were delegated to attend this meeting of the superintendents, in order to talk over the best possible way to use the five technical books on paper making which have been compiled through the efforts of the Technical Association of the Pulp & Paper Industry.

Mr. Carruth was the first speaker. He told of the need of a standard American book detailing the best practices of modern paper making, and went into details concerning the methods used in making the five technical books possible.

After Mr. Carruth's talk there was a general discussion of ways and means which could be used in bringing this valuable information to the men in the mills. Mr. Carruth will present the suggestions made at the next meeting of the Paper Makers' Association.

The next speaker, Mr. Tom Harvey, spoke of the work that has been done along this line by various paper companies in the country, and told of the educational help which is available without cost from the state, and from local teachers as well as from the federal government. Mr. Harvey also read a letter from G. E. Williamson, executive engineer of the Strathmore Paper Company, of Mittineague, Mass., and chairman of the United States Committee, telling of the work done by his company along the lines being discussed.

Mr. George Harvey, the third speaker, told of the work being done by the representatives of the Paper Makers, Felt Manufacturers' Industrial Council and the Technical Association of Paper Manufacturers toward a standardizing of specifications for paper makers' felts. The movement is to get the odd widths of felts eliminated, and to adopt a standard of widths and lengths that will allow the felt manufacturers to cut down on the number of felts they are compelled to make. The point stressed was that paper makers' felts are sold on a cost plus basis, and any saving it is possible for the felt manufacturers to make is directly experienced by the paper manufacturers. An attempt is being made to get a uniform data sheet in regard to felts, so that on orders for felts it will be shown just what a felt is asked to do.

The last speaker of the evening was F. C. Farnsworth, president of the Farnsworth Company of Conshohocken, Pa., whose subject was the proper drying of paper. He told of the systems his company installs, and of the saving that can be accomplished by using the exhaust steam, of closing up the

WE EXTEND TO ALL PAPER MILL MEN A CORDIAL INVITATION TO VISIT OUR PLANT WHERE WE SPECIALIZE IN THE BUILDING OF A WIDE AND VARIED LINE OF SLITTING AND ROLL-WINDING MACHINES WHICH MAKE POSSIBLE THE REALIZATION OF THE MOST EXACTING STANDARDS OF MODERN REQUIREMENTS AS TO SPEED, ACCURACY AND ECONOMY OF WASTE.

WE HAVE BROUGHT TOGETHER IN OUR SHOW ROOM SPECIMENS OF THE WORK DONE ON OUR MACHINES WHICH CONSTITUTE A RECORD OF COMMERCIAL AND MANUFACTURING NEEDS FOR GOODS IN ROLL FORM. AN INSPECTION OF SAME WILL SUGGEST NEW APPLICATIONS AND NEW MARKETS FOR YOUR PRODUCTS, AND NEW WAYS OF UTILIZING YOUR BY-PRODUCTS.

WE PLACE AT YOUR SERVICE THE EXPERIENCE GAINED BY MANY YEARS DEVOTED SOLELY TO THE DEVELOPMENT OF MACHINES AND PROCESSES FOR CUTTING AND ROLLING EVERY SORT OF GOODS USED IN THE FORM OF ROLLS OR COILS.

CAMERON MACHINE CO.
BROOKLYN, N.Y.

RETURN TUBULAR LOCOMOTIVE **BOILERS** **WATER TUBE SCOTCH MARINE**

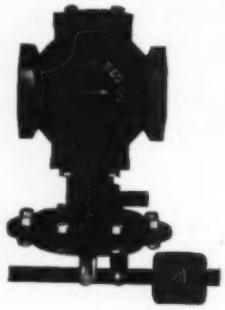
A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS — RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE NOW!

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION — LET **DAVIS** FURNISH THE BOILERS"

LONG DISTANCE TELEPHONE
RANDOLPH 2233

J. F. DAVIS

1122-1123-1124 HARRIS TRUST BUILDING
CHICAGO, ILL.



You can rely on Davis Regulators

DAVIS Regulators are reliable—once set, they will maintain any desired pressure, regardless of fluctuations in the steam supply. Their action is as certain as gravity because they are gravity-controlled by weighted lever arm.

There are a number of types—all are widely used in paper mills. One that finds extensive application is the famous Davis P & W Regulator, shown at the left, for use on any low pressure or vacuum system of steam heating where the delivery pressure to be maintained does not exceed five pounds.

Write the G. M. Davis Regulator Co., 414 Milwaukee Avenue, Chicago, for the catalog that describes all types of Davis Regulators and the complete line of Davis Valve Specialties—any one of which you may send for on the basis of absolute satisfaction or money back.

DAVIS VALVE SPECIALTIES
STEAM SAVERS SINCE 1875

WYCKOFF WOOD PIPE

PRESSURE PIPE THAT NEVER BURSTS.
Built in sizes 1 inch to 48 inches.

The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for Paper Stock and Acids that can be obtained.

The Pipe of Service

DURABLE—ECONOMICAL—EASY TO INSTALL

Built of selected Canadian White Pine, Wyckoff Wood Pipe is wound with steel bands whose tensile strength is 58,000 to 65,000 lbs. per square inch. The experienced engineer selects a pipe of proven dependability. Wyckoff Wood Pipe, during the past 65 years, has built a reputation that stands the keenest competition. It has been, during this time, the choice of the largest pipe users in the world. We also manufacture a high grade underground steam pipe casing.

Write today for catalog and prices

A. Wyckoff & Son Company

1855 Elmira, N. Y., U. S. A. 1920

SWENSON EVAPORATOR CO.

Main Office
945 Monadnock Block, Chicago

Eastern Offices
519 Widener Bldg., Philadelphia
30 Church St., New York

Works
Angola, Indiana
Bedford, Indiana
Harvey, Illinois
Joliet, Illinois

Cable Address, "Evaporator Chicago," Western Union Code

SWENSONS EVAPORATORS

systems and keeping the buckets and syphon pipes always in working order.

The next meeting of the Superintendents' Association will be held in Middletown on March 25th. Mr. George Harvey invited the Association to meet in the assembly hall of the Gardner Harvey Paper Company, and added a condition, that the hall be completely stocked with silver and dishes by that time. In case the hall is not ready, the meeting will be held at the Elks' Club at Middletown. Letters will go out to members telling exactly where the meeting will be held.

American Envelope Company

A contract for the erection of a new building for the American Envelope Company, of West Carrollton, Ohio, has just been awarded to George B. Hicks, a member of the Dayton Builders' Exchange, of Dayton, Ohio. The new building is to be of reinforced concrete construction, four floors in height, and will measure 30 by 278 feet. This addition will require thirty new envelope machines, and the employment of about fifty more people. It is expected that the addition will be completed by July 1st.

The new building and necessary envelope machines are the second half of the expansion plan of the American Envelope Company. This company owns the Miamisburg Paper Company, at Maimisburg, Ohio, where the first part of their expansion plan was put into effect. A 128-inch Fourdrinier for the Miamisburg Paper Company was purchased from the Black & Clawson Company, of Hamilton, Ohio, last July, and one of the two paper machines then in operation at the Miamisburg plant was torn out to make room for the new machine. The new machine, which is expected to give more than 20 per cent more paper than the two old machines, will be ready for operation about the middle of March. When paper is turned out on the large machine, the other small machine will be dismantled to give adequate room in which to operate the large machine. During the dismantling of the one machine and the installation of the new machine, paper has been turned out on the other small machine, to supply the needs of the American Envelope Company.

R. D. Bertschy, treasurer of the Miamisburg Paper Company and of the American Envelope Company, said that about 60 per cent of the output of the 128-inch Fourdrinier will be required to keep the American Envelope Company supplied, and the rest will be sold, as heretofore, through wholesale paper dealers.

The American Envelope Company, who have been turning out five million envelopes a day, as well as the necessary boxes in which to pack them, expect to increase their output about 25 per cent when the new folding machines are installed. Thirty envelope machines are to be built in the company's own machine shop.

Paper Manufacturers Meet

On February 9, 1922, the Miami Valley Paper Manufacturers' Association met for their regular meeting at the Hamilton Club, Hamilton, Ohio. The newly elected president, H. P. Carruth, presided.

The announcement was made of the other officers for this year. They are: Vice-president, L. C. Anderson, of the Oglesby Paper Company, at Middletown, Ohio; treasurer, W. H. Kettra, of the Mead Pulp & Paper Company at Chillicothe, Ohio, and secretary, Adaliade Lungo, also of the Mead Pulp & Paper Company.

The principal subject of discussion was of ways and means to make the best possible use of the five technical boks compiled during the year through the efforts of the Technical Association of the Pulp and Paper Industry. The various mills are anxious to co-operate in the use of this very elaborate and complete course, and to present the benefits to be derived from a study of the books to as many people as possible. It was suggested that courses might be organized and instructors provided by the mills for their employes, but nothing definite was decided.

Two representatives of the Paper Manufacturers' Association were delegated to attend the meeting of the Miami Valley Division of the Superintendents' Association on February 25th, at the Elks' Club at Middletown, Ohio, and to ask the superintendents to voice their views as to the best ways of using the five technical books.

The next meeting of the Miami Valley Paper Manufacturers' Association has been tentatively set for March 10th. This meeting will probably be held at the Elks' Club, at Middletown, Ohio.

Cleveland
WORM GEAR
REDUCTION UNITS

An ideal installation for line shaft

Order one—then check our claims

Competition demands higher efficiency in plant operation.

It is our contention that the *right drive* is as important as the right machine.

We claim that Cleveland Worm Gear Reduction Units—

Take up less space
Operate with more even torque
Operate with less noise
Operate continuously with less attention
Operate at lower maintenance cost
Handle abnormal gear ratios
Show increasing efficiency with use
Are simpler and more durable

and because of their versatility, permit standardizing in plant motor equipment with all the advantages that accrue thereby.

We suggest that you *test our claims*. Find out for yourself.

Order one unit—keep a careful record of its performance—make comparisons. We are confident of the result for 76% of our 1921 sales were REPEAT orders.

Write us for information on drives.

The Cleveland Worm & Gear Co.
America's Worm Gear Specialists
Cleveland, Ohio

New England Representatives
Franklin Machine Co., Providence, R. I.

Pacific Coast Representatives
Alfred H. Coates Co., San Francisco, Cal.

THE WATERBURY FELT CO.

SKANEATELES FALLS

New York

FELTS and JACKETS

Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

They Satisfy

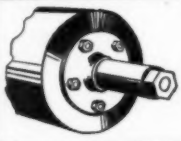
DANA T. McIVER

High Grade Printing Paper

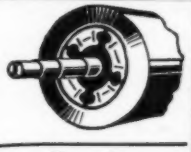
116 So. Michigan Avenue
CHICAGO

BOOK AND COATED PAPER

Car Lot and Tonnage Contracts

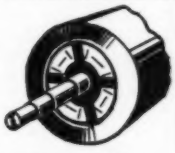


SERVICE
Wood Rolls



A Construction for Every Service

Free Blank Roll Blue Prints sent on request to any Paper Mill



Rodney Hunt Machine Co., 45 Maple St., Orange, Mass.

TRADE MARK L^x QUALITY SERVICE

Let's Get Off to a Good Start

"Calamity howlers" and "weak knees" are finding out the fallacy of their prophecies. Business is better—will be still better.

Cover your requirements liberally. We can quote you most attractive prices on

BOX BOARDS,
PAPER BOARD SPECIALTIES

Samples and prices furnished gladly.

THE C. L. LABOITEAUX CO.

Cincinnati Cleveland Chicago New York

Paper Stock

Now Is the Time to Buy Our Raw Materials

Out of the forty different kinds of paper stock graded in our many large warehouses, you are assured a steady, reliable source for procuring raw materials in practically every branch of paper making.

Having specialized for 35 years in this one field you can depend upon a clean, well-packed, uniform product throughout; fulfillment of delivery promises; and because of our output of 300 tons daily, big tonnage at all times.

Write us your wants and we'll gladly send further information.

Mendelson Bros. Paper Stock Co.

910 South Michigan Avenue, Chicago, Ill.

Long Distance Phones: Harrison 2840 and 5557.

News Personals

Friends of A. L. Rieger, President of the Peerless Paper Company of Dayton, Ohio, receive the news of the death of his wife with a sense of shock. Mrs. Rieger died after a few days illness, on February 16th, at her home, 40 Wistaria Drive, Oakwood, Dayton, Ohio. Mrs. Rieger will be remembered as Anna Rose Dennewitz, the daughter of Professor Christian Dennewitz, deceased, who can be recalled as prominent in the musical world. Mrs. Rieger had her father's gift of music, and was an accomplished violinist.

Mr. and Mrs. Rieger were married in 1891, and to them were born two sons, Lowell P. Rieger, who is associated with his father as secretary and treasurer of the Peerless Paper Company, and Nelson M. Rieger, who is a student at Ohio State University.

Mrs. Rieger was a particularly lovable woman, and left besides her bereaved family, a circle of intimate friends to find solace in memories of happy days. The funeral was held on February 20th, from the home on Wistaria Drive.

J. A. Millar, formerly Commercial Attache of the Swedish Legation at Washington, D. C., has been appointed general manager of the Scandinavian-American Trading Company, wood pulp importers and representative of Scandinavian pulp mills in this country, with offices at 50 East Forty-second street, New York. Mr. Millar is well known in commercial circles in Scandinavia and is also an experienced pulp man. B. Lindell continues as treasurer of the company.

Two new members of the sales staff of the concern are W. E. Ihling and J. Donaldson. Mr. Ihling was formerly with the John Richardson Company, of Boston, while Mr. Donaldson was formerly with Dill & Collins and the J. F. Patton Company.

The J. J. Patricof Company, a partnership dealing in paper mill supplies at 501 Fifth avenue, New York, has been dissolved, and Mr. Patricof has resumed business under the corporate name of the J. J. Patricof Company, Inc., at 347 Madison avenue, New York, where he will continue to handle all kinds of paper stock. The new corporation has a capital stock of $30,000. Harry Rosenberg and M. Reich, formerly of A. Salomon, Inc., and the American Woodpulp Corporation, are associated with Mr. Patricof in the new firm.

At the annual meeting of the Association of American Wood Pulp Importers in New York on February 2, Sigmund Goldman, of the English China Clay Sales Corporation, of New York, was elected president for the coming year, succeeding Leon Gottheil, of Castle, Gottheil & Overton, who declined re-election because of poor health. Mr. Goldman was for a number of years president of the association up to a year ago, when Mr. Gottheil was elected in his stead.

L. B. Steward, at one time secretary of the American Paper and Pulp Association and widely known in the industry, has been appointed general manager of the firm of Clement & Stockwell, Inc., one of the oldest paper jobbing houses in New York City. Charles W. Mairs, former manager of Clement & Stockwell, Inc., is now affiliated with the White-Burbank Paper Company, paper merchants of 79 Walker street, New York.

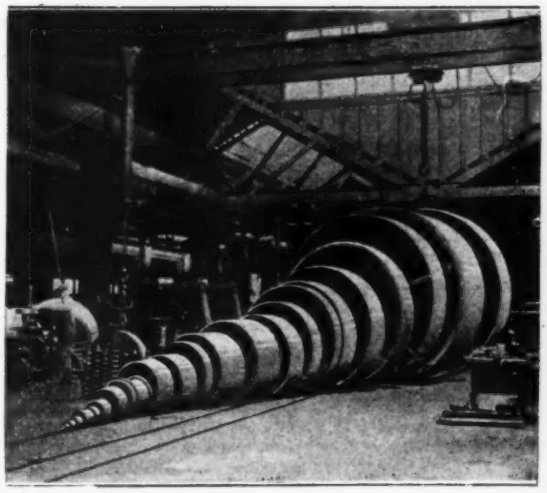
At the recent annual meeting of the Perkins-Goodwin Company, large distributors of paper and pulp of 33 West Forty-second street, New York, the following officers were elected for the ensuing year: President, Louis Calder; Vice President and Treasurer, F. W. Westlake; Secretary, John Atkins, and Directors, Charles W. Rantoul, W. H. Anders and James A. Brady.

The E. R. Mosher Company, Inc., paper dealers of New York, announces that M. Deverich, formerly connected with the Interstate Pulp and Paper Company, Inc., also of New York, in the capacity of purchasing agent, has severed his connection with the latter concern and is now vice president of the Mosher company.

Charles Irving Foster, son of Charles H. Foster, assistant sales manager of the American Writing Paper Company, has joined the general service department of that company and will be in the New York branch office.

C. A. Buskirk, for a number of years general manager of the Wolverine Paper Co., Otsego, Mich., was recently elected president of the company.

A PULLEY
FOR EVERY PURPOSE



This will give you an idea of the wide range of sizes and styles of Cast Iron Pulleys that is constantly flowing through our shops.

Every one has been designed and will be used for some specific service—so you see they represent more than just "Pulleys."

Every article that goes to make up

The T. B. WOOD SONS CO. Line

of Power Transmission Machinery receives the same careful Engineering attention and can be furnished in the same wide variety of sizes and styles as the pulleys shown above.

Let us have an opportunity of figuring on your "Pulley Problems."

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

POWER TRANSMITTING MACHINERY

Wanted

One nine-roll 72" supercalender including electric drive. If not electric driven, advise type of drive. Also advise make of stack and drive, and if they can be seen in operation. Address Lakeview Paper Company, Appleton, Wis.

WANTED

High-grade salesman for selling pulp and paper mill machinery. Address all applications care of The Paper Industry, Box 36.

Claflin Continuous Beaters

"Beat the Stuff That's Hard to Beat"

CLAFLINS meet every beating demand, stand the hardest usage, and deliver a greater percentage of properly beaten stock than any tub-beaters or other beating engines.

CLAFLIN ENGINEERS can solve your most troublesome beating problems.

Inquiries cheerfully answered

The Claflin Engineering Company, Lancaster, O.

Wanted—Salesman

Man who is familiar with the paper mill trade to sell Jordan filling, fly bars and bed plates. Reference required. State wages expected. Address The Paper Industry, Box 37.

The "Hamilton" Felt

Our Cylinder Wet Felts for 9 points straw and for roofing are *open* in texture, *do not* stretch and *are durable.* A trial is invited.

SHULER & BENNINGHOFEN
HAMILTON, OHIO

Standard Ultramarine Blues

For the Paper Industry

ASK FOR SAMPLE OF

NEOS R BLUE

The Highly Alum-Resisting Ultramarine

AGENTS
E. M. & F. WALDO, 10 High Street, Boston, Mass.
THE WESTERN PAPER MAKERS CHEMICAL COMPANY
Kalamazoo, Mich.

Manufactured by
THE STANDARD ULTRAMARINE CO.
Huntington, West Virginia

Rebuilt Paper Mill Machinery in Stock and Guaranteed

Not Where Is and As Is

FOURDRINIER TISSUE MACHINE—One 96", one 68".
FOURDRINIER PARTS—Pusey & Jones 118", 100". Kutter Trowbridge 96".
PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housing two sets 18"x96", Black & Clawson swing arm housings with rolls.
DRYERS—Four 48"x111", thirteen 36"x95", four 48"x68", one 84"x67", eleven 42"x66".
MARSHALL DRIVES—Two Black & Clawson self-contained stand with friction clutch cone pulley and 6" mortise gears. Mortise gears and pinions for Pusey & Jones Marshall drives 5" to 8" face.
CHILLED CALENDERS—One 66" face, five roll, one 54" face, five roll.
DILLON DOCTORS—For Machine Calenders 60" to 120" face.
SLITTERS AND WINDERS—One 120" Warren, one 108", 36" Kidders.
REELS—Pusey & Jones two drum upright 48" to 114".
BEATERS—Five 72"x42" Noble & Wood, one 66"x42" Noble & Wood, equipped with three cylinder washers; one Dilts 62"x50" iron tub, one Jones 62"x52", seven Horne 36"x36". Two No. 2 Claflins, two No. 1 Claflins.
JORDANS—One Wagg Majestic, three No. 2 Dillon Improved, one large Horne, four Monarch, one Jones Standard, two Pope Brushing engines.
SCREENS—Six 10 plate open side Packer, two 6 plate, one Moore & White auxiliary.
STUFF PUMPS—Deane triplex 9"x8", Gould triplex 8"x10", Sandusky triplex 4"x6".
REVOLVING SHEET CUTTERS—One 104" Horne, five 61" Hamblet, four 61" Finlay, one 50" Hamblet diagonal, one 42" Finlay.
WET MACHINES—Four 72" Bagley & Sewall Hydraulic.
SUPER CALENDERS—One 45", one 42", one 36" Holyoke.

We have a large number of pumps and over five hundred calender, press and couch rolls in stock.

Frank H. Davis Company

175 Richdale Avenue, Cambridge, 40, Mass.

Sticktuitiveness!

To have worked 49 years in one establishment and never to have worked anywhere else is the unusual record of Conrad Getz, of 1420 East Maple Avenue, Hamilton, Ohio, Beater Engineer of The Beckett Paper Company and dean of the paper makers of Hamilton.

Mr. Getz was born on High Street, Hamilton, in 1860. He went to St. Stephens School and on December 20, 1873, got his first job as helper on the rag cutter in the mill of Beckett, Laurie and Company, now the Beckett Paper Company.

In the next two or three years Mr. Getz was twice transferred, holding positions as beater helper and washerman and then a beater engineer.

For about 45 years Mr. Getz has held this place and in that time he has seen a remarkable development in the mill of the Beckett Paper Company and a good deal of progress in the art of paper making. It is doubtful whether there is another man in the American paper industry who has so much experience in the preparation of paper stock, and the business has developed few more capable or popular men. Despite his long service Mr. Getz is today at the height of his physical and mental powers and his friends all believe that he has before him many years of usefulness and happiness.

At a recent convention of the Printing Trades Secretary-Manager Association held in Indianapolis, Mr. Jos. A. Borden, formerly general secretary of the United Typothetae of America and now director of the Department of General Service of the American Writing Paper Company, was presented with a handsomely engrossed and illuminated testimonial of appreciation by Henry M. Ellis, secretary of the New Orleans Typothetae, on behalf of the Association.

Charles W. Bell, who is well known in the board making business, and has been connected with many different companies in this country, has now opened an office in Dayton, Ohio, as a consulting specialist in the manufacture of paper box board, test board, fiber board and straw board and other fabrication into corrugated and solid fiber shipping containers, etc.

Ralph B. Maltby, treasurer of the Hanna Paper Corporation, of Watertown, N. Y., which concern was recently taken over by the St. Regis Paper Company interests, has been elected a vice president of the St. Regis Paper Company, thus becoming officially identified with the joint interests.

Wilson W. Galloway has been made general manager of the Hagar Board & Paper Co., Cedarville, Ohio, to succeed his brother, Dr. Chas. E. Galloway, who is president of the company and who will move to Evanston, Ill., to resume the practice of medicine.

E. L. Kinzly, who for several years has been president of the Lincoln Paper Mills, Merriton, Ontario, Canada, has resigned his position and has been succeeded by Peter Nesbit, formerly with the Hammermill Paper Company, Erie, Pennsylvania.

The J. J. Partridge Company, of New York City, has been incorporated under New York State laws to conduct a business in papermakers' supplies with a capital stock of $50,000. I. J. Marx, T. J. Stapleton and L. Sills were the incorporators.

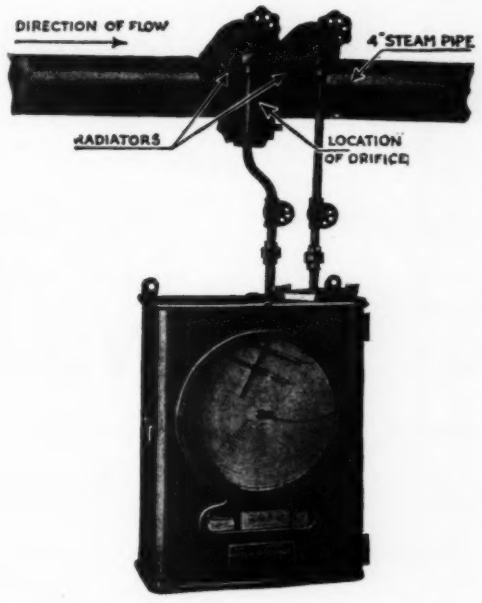
Mr. James Murray, formerly superintendent of the International Paper Co.'s mill at Berlin, N. H., has been made general superintendent of St. Maurice Lumber Co., Ltd., the International Paper Company's mill at Three Rivers, Quebec.

Frank P. Lyden, of the International Paper Company, recently left the New York offices of the company at 30 Broad street to become supervisor of the fine paper division of the I. P. mills at Winnipissogie, N. H.

J. A. Fisher, who has owned one-half interest in the Beloit Box Board Co., Beloit, Wis., has with his two sons, Ralph M. and Ernest R. Fisher, bought the remaining half interest which has been owned by Fred M. Coons.

James A. Donoghue, who for the past 14 years has been with Coy, Hunt & Co., has severed his connections with the above corporation to become a member of the new firm of Coy, Disbrow & Co., Inc.

Bailey Fluid Meter



PRACTICAL — ACCURATE

This shows the Bailey Fluid Meter complete for the measurement of steam. It consists of the Monel metal orifice installed between a pair of flanges, radiators and valves tapped into the pipe on the inlet and outlet sides of the orifice and pipes connecting these to the recorder.

Bailey Fluid Meters are easily and cheaply installed as changes in piping are not required and the accuracy is guaranteed.

They are the most practical and satisfactory meters for recording and integrating the flow of steam to turbines, digesters, paper machines and other processes. Steam can be measured at any pressure and temperature, exhaust steam included.

Either pressure or temperature recorders, or both, may be added to record on the same chart as the rate of flow.

Our engineering department is ready to suggest the proper equipment for your service.

The BAILEY METER COMPANY
2023 East 46th Street, CLEVELAND, OHIO

FOURDRINIER WIRES

Dandy Rolls *Cylinder Molds*

Brass, Copper and Iron Cloth

Bank and Office Railings

WIRE SIGNS

Cheney Bigelow Wire Works

Established 1842 SPRINGFIELD, MASS.

Real Merit Placed

Lindsay Fourdrinier Wires

In Many Mills

HONEST SERVICE KEEPS THEM THERE

They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

Superintendents' Convention in June

As has been noted in a former issue, the next Semi-annual convention of the American Paper & Pulp Mills Superintendents Association will be held at Kalamazoo, Michigan on June 1, 2 and 3.

An invitation has been extended to the Cost Association of the paper industry to meet with the superintendents at this time, and this invitation has been accepted and a Committee on Arrangements has been appointed by the Cost Association as follows:

James A. Riley, American Paper Company, Harry C. Bradford, Allied Paper Mills, Thomas J. Burke, Sec.-Treas. of the Cost Association of the paper industry.

Michigan Superintendents' Meeting

A large attendance was noted at the meeting of the Michigan Division of the American Paper and Pulp Mill Superintendents Association which was held jointly with the Kalamazoo Valley Cost Association at the Park-American Hotel in Kalamazoo, on February 16.

A fine dinner was served, after which a very entertaining talk was given to those present by Fred M. Hodge, president of the Kalamazoo Paper Company. Mr. Hodge dwelt in many reminiscences of how things used to be among the paper mills and the changes that had come over these plants in the past few years.

Mr. L. P. Corey, of Scovell, Wellington Company, Boston, also gave a very interesting talk on "Mill Costs" prepared for the executives.

Rochester to Have Paper Show

Rochester, N. Y., is staging a paper-making exposition for the three days of March 9, 10 and 11th, at Powers' Hotel. This exhibition is being featured in connection with the second annual convention of the Second District Typothetae Federation.

The miniature Fourdrinier machine, belonging to the American Writing Paper Co., will be on exhibition. A feature, which has not yet been exhibited in conjunction, and will therefore be an interesting innovation, is a drying loft made to the same scale as the machine. Another new addition to the outfit will be a sizing equipment set in similar proportions.

Officials of the American Writing Paper Co. will be on hand to explain in detail all the questions connected with the manufacture of paper, thus to make it of real constructive value in educational service to printers and other paper consumers.

The United States Envelope Co. will have an interesting exhibit of envelope-making.

Paper Manufacturers to Exhibit at Graphic Arts Exposition

A showing of every grade of paper and cardboard is planned for the Boston Graphic Arts Exposition at Boston, August 28 to September 2, 1922. Paper manufacturers and dealers will exhibit the raw materials, show the manufacturing processes and the finished products on a scale never before attempted.

This opportunity for paper buyers and members of the International Association of Printing House Craftsmen to get a complete education in the manufacture and use of paper will be taken full advantage of, and the result should be of inestimable value to all of them.

Addresses on paper subjects will be included in the convention program and these addresses will be printed and sent to the membership as part of the record of the proceedings.

Paper manufacturers and dealers are showing a keen interest in this display as they appreciate this opportunity to participate in a graphic arts exposition at which their products are given appropriate attention and prominence.

Filer Fiber Co. to Build Paper Mill

Stockholders of the Filer Fiber Company cut a juicy melon in the shape of a 30 per cent stock dividend yesterday, left $58,000 in the surplus and undivided profits account untouched, increased the capital stock to $1,000,000, and then voted to build a half-million dollar paper mill even larger than the one projected a year ago.

The big stock dividend represents a division among the stockholders of a part of the accumulated profits of the past four years' operations after deducting a loss of $58,000 which the company suffered last year, due to the collapse of the American market resulting from importations of Swedish, German and Finland pulp.

WAUSAU SULPHATE FIBRE CO.
MOSINEE, WISCONSIN
TRADE MARK
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Cut down *excessive* wrapping paper investment. Why carry two wrapping paper lines for one wrapping paper *purpose?*

MOSINEE

presents a perfect wrapping paper, weight and strength for each wrapping purpose. Made in all weights from 15 pounds to 100 pounds basis. The one complete, standardized and economical line of wrapping paper sold.

Mosinee Kraft

"The Wrapper that Delivers the Goods"

GROUND WOOD
CHEMICAL PULPS

PERKINS-GOODWIN CO.
NEW YORK

PAPER

Appleton

Felts & Jackets

We have for a long number of years furnished felts for some of the largest pulp, board, news and writing mills in the country.

Manufactured By
APPLETON WOOLEN MILLS
APPLETON ·· —— ·· WISCONSIN

Skayef Ball Bearing Hangers

The improved Skayef Ball Bearing Hanger manufactured under the supervision of S. K. F. Industries, Inc., is distinguished by several valuable features of design. The hanger is built around the S. K. F. marked self-aligning ball bearing—the bearing which made the old type hanger used in over 7,500 installations so remarkably satisfactory.

The improved hanger, however, uses the principle of two point suspension, carrying the bearing in a split housing which is rigidly held by two threaded suspension rods. This makes a strong, compact unit easy to assemble, locate and inspect. Any necessary vertical or horizontal adjustment can easily be made at the end of the housing by means of lock

nuts and set screws provided; this eliminates the possibility of applying pressure which might be transmitted to the bearing while making adjustments.

The valuable feature of self-alignment furnished within the bearing, itself, enables the shaft to turn freely at all times with a minimum amount of friction and prevents rubbing, heating and binding. Millwrights will appreciate the fact that Skayef Hangers permit them to lay the shaft out on the floor with the bearings in plain view and then raise it into position for final adjustment with the upper half of the housing off, thus assuring absolute correct assembly.

Freedom from trouble and the large amount of power saving possible make the Skayef Hanger particularly valuable, and permit a chance to decrease operating costs in the average plant.

Court of Appeals Sustains Zeolite Water Softener Patent

The U. S. Circuit Court of Appeals, Second Circuit, N. Y., rendered an opinion on February 14, 1922, affirming a decision previously handed down by the Federal Court at Buffalo, N. Y., that sustained a patent owned by The Permutit Company, 440 Fourth Avenue, New York, covering zeolite water softeners. According to this decision all zeolite water softeners on the market not manufactured by them are an infringement of this patent. The following extracts are taken from the Circuit Court's opinion.

"The patent is claimed to disclose an apparatus for utilizing zeolites having a sodium base in the softening of water. The zeolites take the hardening constituents, lime, or lime and magnesia, completely out of the water even though there originally were sodium compounds in the water."

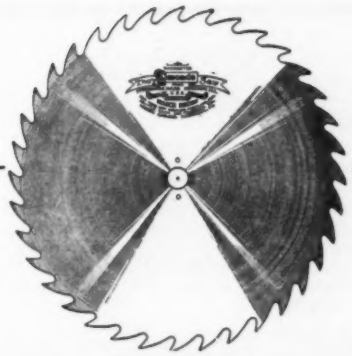
"By the use of the apparatus in suit, for the first time, zero water has been produced."

"It is a great advance in the art of softening water. Its savings to manufacturers have been enormous."

"It is that class of inventive thought which it was the intention of Congress to protect as a valuable contribution to the useful arts. The inventor is entitled to his reward and the appellee to its protection."

"Decree affirmed."

The Crystal Tissue Company, manufacturers of tissue paper with mills in Middletown, Ohio, has opened an office in Room 926 of the National City Bank Building, 17 East Forty-second street, New York, with W. E. Piper in charge. The company also maintains sales offices in Chicago, Kansas City, Boston, Baltimore and St. Louis.



SIMONDS SAWS

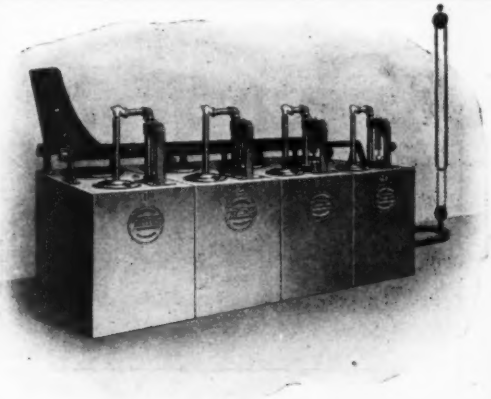
Simonds Saws, Solid or Inserted Tooth Circular, used in your mill will help increase your output and at the same time keep down your saw repair bill. They are strong, sturdy saws that are made of the toughest kind of steel. They hold their tension and retain their cutting-edge longer.

Write for Catalog and Prices

Simonds Manufacturing Co.

"The Saw Makers"

Fitchburg, Mass. Chicago, Ill.



Do You Know What Your Losses Are From Improper Oil Storage?

Do you realize the amount of money you can save annually by installing approved storage equipment?

Your case is no different from hundreds of others who have found TOKHEIM SYSTEMS a most profitable investment.

Let us prove it to you—no matter how extensive or how simple your requirements are.

Illustrated Bulletins on Request

TOKHEIM OIL TANK & PUMP COMPANY

1617 Wabash Ave. Ft. Wayne, Indiana

KNOW WHAT YOUR COAL BILL SHOULD BE

There's no longer any such commodity as "Cheap Coal," and indications are that there probably never will be again. At present prices, or for that matter—at *any price*—it is neither good engineering practice nor good management to check your coal by mine weights or railroad weights.

RELIANCE WEIGHING MACHINES

insure an *accurate* and *positive* check on every ounce of coal consumed. They provide a means, without additional labor cost, of checking the total received against the total purchased. They show to operator and executive the exact amount of coal consumed by each boiler. They bring efficiency and economy into coal consumption.

Weighs—records—indicates—without manual effort—the entire operation automatic.

Each machine is a unit in itself, so perfect in design and flexible in application that it will meet any existing plant conditions.

The services of our engineers are at your command in helping you plan prospective installations.

Write us for details.

RELIANCE WEIGHING MACHINE CO.

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LUDINGTON, MICHIGAN

Representatives in principal cities United States and Canada

STACKS BREECHINGS TANKS

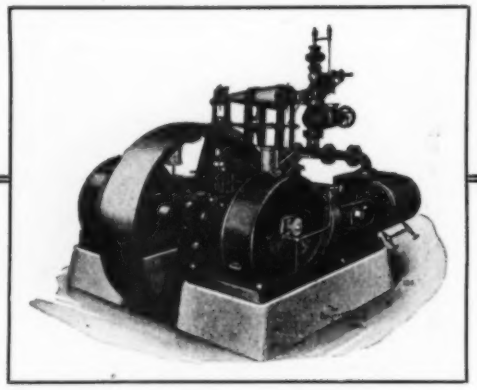
Our erecting facilities are such as to make it possible for us to replace or repair smoke stacks in any part of the United States.

LITTLEFORD Steel Smoke Stacks and Flues are ENGINEERED to suit the individual requirements of every purchaser. The design and methods employed in their erection are the results of over thirty years' experience.

Our engineering ability and experience is at your disposal for the asking.

LITTLEFORD BROS.

500 E. Pearl St., Cincinnati, O.



THERE can be no economical substitute for the best in variable speed engines to drive your paper machine.

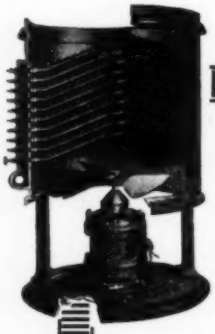
Brownell built the first

Variable Speed Engine

thus eliminating intermediate speed change device. And from the very first there has been only one goal—to produce an engine that will give the utmost in continuous, reliable, day-in and day-out service.

Bulletin E-4 gives a detailed description of this engine.

The BROWNELL CO., Dayton, O.



A Convenient Heating Unit

easily installed for either temporary or permanent heating service.

The *Bayley* B.T.U.

is a complete self-contained heating unit with a heating surface consisting of individual spiral radiator coils one above the other (individually valved if desired). Heat is uniformly distributed by forcing the cooler air along the floor line through these coils by means of an electrically driven fan, thus creating a steady stream of tempered air and producing uniform temperature throughout the room. To install simply set on floor and connect steam and return piping and wiring to motor.

Send for bulletin today

Bayley Mfg. Co.
Dept. "B"
MILWAUKEE, WISCONSIN

Short Cut of Pulp Wood

The Maine woods are down in the most severe slump experienced for nearly a half-century, according to officers of lumbermen's employment agencies.

Men in close touch with the industry say, for instance, that less than half the usual supply of pulp wood and only a few million feet of long logs will come down the Penobscot River this spring and similar conditions are reported in all parts of the state.

The large pulp companies, most of them greatly overstocked with wood cut last year and before, have cut down their operations about 50 per cent and there are no small operators in the woods at all.

Boxes from Pulp

A report from Spokane, Wash., states that with the idea of making use of a newly invented process for manufacturing cardboard boxes and containers direct from wood pulp, two companies have completed organization and are now preparing for the erection of two factories through Spokane and northwest men and local capital.

One of the companies is the Sanitary Pulp Products Company, which will build a factory at Milwaukee. The other is the Canadian Pulp Process Company, Ltd., which is erecting a factory at Vancouver, B. C. Each of the companies is capitalized at $250,000, one to operate in the United States and the other in Canada.

Geo. P. Berkey, Vice-President and General Manager of the Consolidated Water Power and Paper Company of Wisconsin Rapids, Wisconsin, has purchased at public auction from the estate of the Kaministiquia Pulp and Paper Company, the groundwood plant at Pt. Arthur, Ontario, consisting of a mill of thirty tons capacity, and sixteen acres of property under a ninety-nine year lease.

This mill was started in 1921, at an estimated cost of nearly a half million dollars, and was in operation less than three months.

The price which was paid for the property was stated to be $175,000.

New Machine Running

A number of important improvements have recently been made in the Park mill of the Marinette & Menominee Paper Co., at Marinette, Wis. A new Yankee paper machine has been installed, which is said to be one of the largest of this type ever made.

The former warehouse was enlarged to make room for this machine. A new Niagara beater has also been added to the equipment.

May Build Large Plant at Three Rivers, Quebec

A report states that preliminary steps are being taken for the building of a large pulp and paper making plant to be known as the Three Rivers Pulp & Paper Company, with a capital of from three to four million dollars.

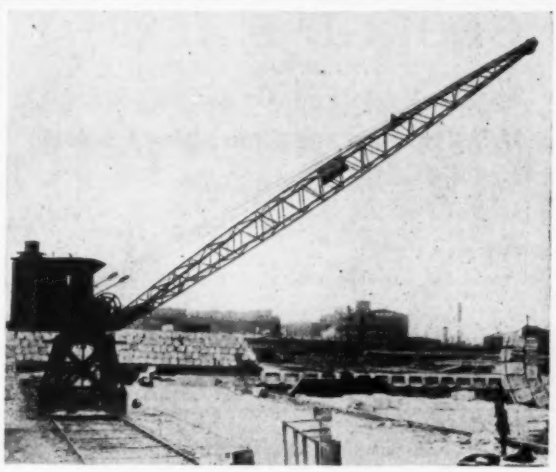
Whether this will develop into a real proposition or not, will be decided in the near future.

Newly elected officers of the Society of American Foresters elected for the present year are: President, E. A. Sherman, Washington, D. C.; vice-president, H. H. Chapman, New Haven, Conn.; secretary, W. N. Sparhawk, Washington, D. C., and treasurer, F. W. Besley, Baltimore, Md.; member of Executive Council for five years ending 1926, R. C. Bryant, New Haven, Conn.

The Hinde & Dauch Paper Company, whose main office is at Sandusky, Ohio, announces the following changes in its Executive Personnel: Sidney Frohman, chairman of the Board; Frederick Emmons, president; J. W. Harbrecht, vice-president; O. F. Rinderle, treasurer; C. N. Kiefer, secretary; W. F. Pfeiffer, assistant secretary, and R. K. Ramsey, general counsel.

It is reported that G. E. Robertson & Company have purchased the site at Hinsdale, New Hampshire, formerly owned by the G. A. Robertson Company, on which they will erect a new paper mill.

A report advises that several gentlemen of Los Angeles, Cal., have gone to England to interest capital in a big paper-making plant for that city.



You Can Trust a Brownhoist

Every pound of wood pulp that goes into the Tidewater Paper Mills at Brooklyn, N. Y., must be handled by one of their two Brownhoist locomotive cranes. These cranes must be kept going to keep the plant operating.

In the five years they have been in use, these cranes have not broken the faith their owners placed in them. About 87,500 tons of wood pulp are handled per year at a cost of 15 cents per ton. Service of this kind comes only in well built cranes, and Brownhoist cranes are well built.

Many paper companies are cutting costs today by handling their coal, pulp and other materials with a Brownhoist. We believe our catalog K on locomotive cranes will interest you. May we send you a copy?

The Brown Hoisting Machinery Co.
Cleveland, Ohio

Branch offices, New York, Pittsburgh, Chicago, San Francisco and New Orleans

BROWNHOIST

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M. AM. SOC. C. E.
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Paper Mill Architect and Engineer

208 N. Laramie Ave., Chicago, Ill.

V. D. SIMONS

Industrial Engineer

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J. H. WALLACE & COMPANY.
TEMPLE COURT BUILDING
NEW YORK CITY, U.S.A.
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Engineering Service for Paper Mills
Construction and Production

BOOK, BOXBOARD, BONDS AND LEDGERS, TISSUE, ROPE MANILAS AND SPECIALTIES

Western Paper Makers Chemical Company

Paper Makers Chemical Company

Kalamazoo, Mich. Holyoke, Mass. Easton, Pa.
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Rosin Size, Satin White, Clays, Fillers
Foam Killer, Felt Soap and Other Specialties

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INCORPORATED
30 CHURCH STREET, NEW YORK
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The Largest Dealers in NEW & USED TANKS

AT THE PRICES WE MAKE WE SHOULD SELL A TANK EVERY THIRTY MINUTES

We are anxious to become so well known that when a man thinks of tanks he will automatically think of CURTISS-WILLIS. We are building and selling new tanks of all kinds in every part of the country.

W. C. Sargent of Chain Belt Co. Dies

William C. Sargent for twenty-two years secretary and also a director of Chain Belt Company, Milwaukee, died suddenly on February 5th as a result of heart failure. He was seventy-three years of age and had been in ill health for several years.

Mr. Sergeant, prominent in industrial circles of Milwaukee and St. Paul, had a wide national acquaintanceship. In 1900, he went to Milwaukee to become secretary and later a director of the Chain Belt Company. He was also a director of the Federal Malleable Company, West Allis, Wisconsin. His father was one of the founders of the Terre Haute, Alton and St. Louis Railroad.

Mr. Sargeant established many of the early business connections of the Chain Belt Company, many of which are still among the Company's jobbers.

The Dyes Distributing Corporation, 227 W. Huron Street, Chicago, Ill., announce that they have been appointed selling agents for the western territory of the Cincinnati Chemical Works, Inc., Ciba Company, Inc., Geigy Company, Inc., and Sandoz Chemical Works, Inc. They are in a position to offer large and complete lines of domestic and imported dyestuffs and chemicals from stocks carried in Chicago, Cincinnati, Portland, San Francisco and Los Angeles, and with numerous well equipped laboratories will serve promptly and efficiently.

The Leshner Paper Stock Company announce that they will move their business to Lockland, Ohio. The administrative headquarters will be immediately established at Lockland and a plant put in operation at this point just as quickly as possible. The officers will continue their residence in Hamilton and a number of the staff now employed at Hamilton will be associated with the company at the Lockland offices. On and after February 15th, all communications should be addressed to Lockland, Ohio.

F. W. Roberts Manufacturing Company, Inc., Lockport, New York, announces the completion of the first complete burr manufacturing unit in Canada at Niagara Falls, Ontario. This is an important step for the ground wood mills in Canada, for it will enable them to purchase burrs made in Canada at prices which will compare favorably with United States prices. At the same time deliveries will be very prompt.

The Indiana Fiber Products Co., Marion, Ind., has been making extensive improvements in their plant. A large fireproof warehouse, 70x120 feet, has been built, and a Whiting Overhead electric crane has been installed to handle rolls of paper. A new office building has also been constructed, and a new shipping department will now be built.

A new company, controlled by the Bryant Paper Company, Kalamazoo, Michigan, has been formed to take over the business of Oscar Gumbinsky & Bros., paper stock dealers. The plant occupies practically an entire block, and is situated on the railroad tracks in Kalamazoo and is an ideal point for incoming and outgoing shipments.

A branch office of the Seaman Paper Company, of New York and Chicago, has been opened in the Massachusetts Trust Building in Boston, Mass., with Robert Shatsneider in charge.

Officials of the Trinity Paper Mill Company, who have a pulp mill at Commerce, Texas, are making plans to start a waxed paper plant at Dallas, Texas.

We are advised that the Tomahawk Paper & Pulp Company expects to start up its new paper about April 1, after a shut down since the first of the year.

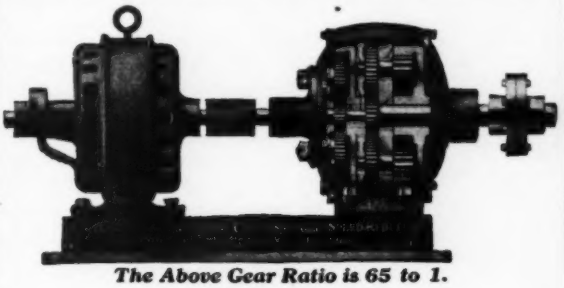
The Combustion Eng. Corporation, New York City, has just issued an interesting pamphlet on Type K Stokers as applied to small boilers.

Reports state that Grand Junction, Colo., is experiencing a boom with the possibility of having a new paper mill built at that point.

A report states that there is prospect of a new strawboard mill being built at Jefferson City, Mo., by the Standard Crate & Filler Co.

We are advised that the Falls Mfg. Co., Oconto Falls, Wis., contemplates building a new paper mill at that place.

FOOTE
SPUR GEAR
SPEED REDUCERS
AND WORM GEAR REDUCERS



The Above Gear Ratio is 65 to 1.

Eliminate Wasteful Methods

Foote Speed Transformers overcome the objections caused by open back gearing, chains and belts for speed reduction. They eliminate costly belt, gear and chain replacement, and prevent delayed production.

Foote Design Provides Highest Efficiency

Foote Speed Transformer design gives highest efficiency, compactness, durability and strength.
Foote Speed Transformers are entirely enclosed, oil tight, dust proof and fool proof.
They are simple in design, require practically no attention or maintenance.

Consult Foote Engineers

Foote Bros. Gear & Machine Company
Manufacturers of Rawhide and Bakelite Pinions and Cut Gears of All Kinds—Send for Catalog.
Special Machinery Made to Order. Submit Your Blue Prints.
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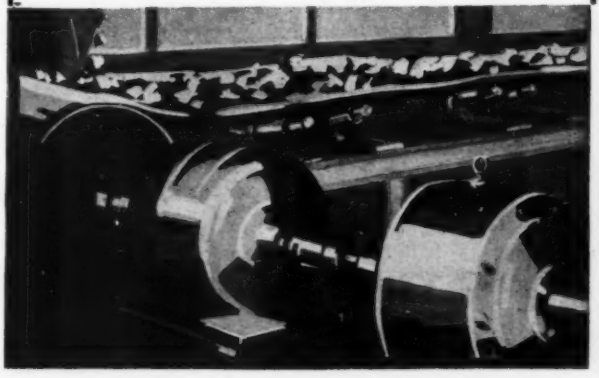

Plamondon Transmission Machinery

Products

Heavy Gearing and Friction Clutches for paper-mills, rubber-mills, tubemills, cement-mills, rolling-mills, stone quarries, and rock products, mining and coal-handling machinery, elevators and malt houses, turbines and water wheels, sugar refineries, packing houses, electric light plants, powder-mills, glass factories; cut gears and machine molded gears of all kinds.

Shafting, pulleys, hangers, couplings, collars, pillow blocks, worm-wheels, fly-wheels, and rope sheaves.

Makers of grey iron, and semisteel castings by analysis.

Special machinery built to order on modern tools at usual shop rates.

A. Plamondon Manufacturing Company

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Emergency Orders Receive Special Attention

E. D. JONES & SONS CO.

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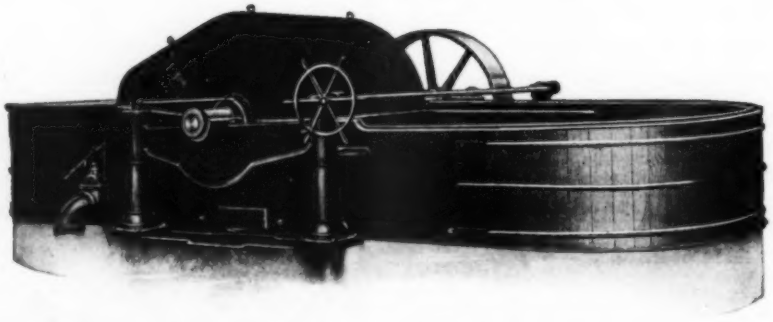
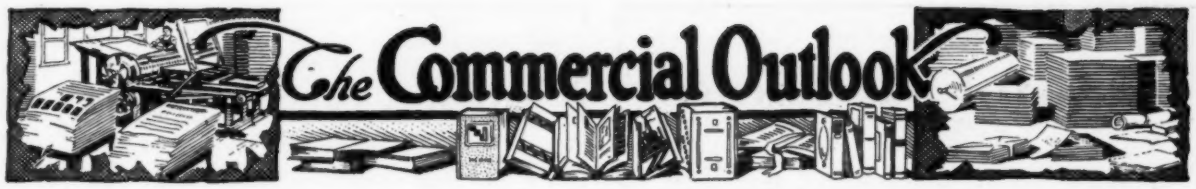


Beating Engine, Tub of Iron or Wood

Manufacturers of

Paper Making Machinery



WHILE there seems no question that fundamentally the paper industry is steadily working into a stronger and sounder position, expansion of demand for most kinds of paper is such a slow process that the increase in business can scarcely be detected from day to day. Consumers continue to absorb paper supplies in strictly hand-to-mouth fashion, and show little or no inclination to lay in stocks; moreover, the average consumer is not using the quantity of paper today that he ordinarily does and consequently is in the market for relatively smaller amounts. It is becoming more and more evident that the quietness obtaining in the paper trade is due not to conditions prevailing in the paper industry itself but to the condition of the various consuming trades. Paper prices in a great majority of cases have been reduced to where they compare very favorably with pre-war levels and where consumers should not be hesitant to absorb plentiful supplies. In fact, it can be said that in numerous instances the indications are for higher paper prices rather than for further decline, because paper prices in some cases have been brought down to below where they rightfully should be under existing manufacturing circumstances. The reason, however, that demand for paper is slow is not because consumers haven't faith in the stability of paper prices and are holding back in buying in expectation of lower costs, but because conditions in their own spheres are such as to prompt them to exert much caution in purchasing raw material and to proceed very carefully in granting credit and in conducting their business.

As an apt illustration, take the conditions affecting the paper jobbing fraternity at present. It is generally conceded that the average paper merchant hasn't half of the stock on his shelves that he ordinarily carries. Jobbers argue that the money situation is such as to prompt them to keep their capital in as liquid a state as is possible, that they must be extremely cautious in selling even their regular customers on credit, that the supply situation in the paper industry is such that they can see no necessity of stocking up because they can quickly procure shipments from mills when in need of paper, and that demand from printers, publishers and the various other users of paper is of such piecemeal variety that it does not profit them to keep usual amounts of paper in their warehouses—all of which tends to make for very painstaking and narrow buying by the paper jobber. That paper mills are feeling these conditions goes without saying because there is not sufficient business obtainable today to anywhere near give every paper producer enough to do to keep his plant fully engaged. It is commonly conceded that if market conditions would improve in a way to bring jobbers to mills to acquire supplies in no larger tonnage than they customarily carry that the paper manufacturers of the country would easily have enough orders to warrant capacity output for a period of quite a few weeks.

As stated above, however, the improvement is very slow. General business conditions are unmistakably on the mend, and it seems only a matter of time when business in the various industries will be back to normal and when demand for the different kinds of paper will expand to satisfactory dimensions. The leading capitalists, manufacturers and merchants of the country predict good business this year, but even they qualify their predictions by saying that it will take time for things to get back to where everyone desires to see them. Optimism appears to be the keynote of the business world, and commercial history has proven that when a large majority of minds run in the same channel conditions sooner or later shape themselves in accordance with the views of those who really create business conditions.

On the surface it would appear that the paper market, as respects most kinds of paper, has been quieter during the last several weeks than was the case in January. Demand for some grades of paper has seemingly slumped to an extent following a noticeable pick-up in business soon after the turn of the year. What the definite or immediate reason for this has been, it is difficult to ascertain. Probably it has been caused by a good many consumers of paper temporarily dropping out of the market as buyers after having covered their wants for a time during the buying spurt early in the new year. Perhaps also it may have been due to paper consumers holding off while figuring out what their prospective spring requirements are likely to amount to. At any rate, most kinds of paper have moved in somewhat smaller quantities, which has created keener competition among manufacturers for as large a share of the business as has been available, which in turn has made for a little softer price undertone. There has been no drastic revision of prices by paper producers but it can be readily seen that the great bulk of orders are being booked at prices close to the low edge of quotational ranges. In fact, some paper mills have gone so far as to cut prices in an effort to attract more buying.

The news print situation is moderately firm, perhaps as firm as any other branch of the paper market. There is a relatively good demand for print paper; publishers are taking contract supplies regularly, and are frequently coming into the market for spot lots. Figures compiled by the News Print Service Bureau show that production of print paper in the United States and Canada in January was well up to normal, amounting to 174,807 tons, compared with 167,839 tons produced in December, and being 84.1 per cent of the average daily production during the three months of greatest output in 1920 and 1921, with allowances for new machines. Moreover, shipments by mills in January almost equaled the production, amounting to 174,247 tons, while mill stocks at the end of January totaled but 33,656 tons, or approximately four days' maximum production.

The wrapping paper market is feeling to no small extent the competition of foreign paper. Substantial amounts of kraft wrapping have recently been imported into this country from Sweden and sold at prices considerably below those quoted by domestic manufacturers, with the result there is a very uncertain tone to wrapping paper prices. Leading domestic producers are reported still quoting 7.50 cents per pound for No. 1 kraft wrapping, but it is stated that 7 cents is really nearer the actual market level at present than the higher figure. Tissues are in comparatively slow demand but quotations are fairly well maintained at around a basis of 90 cents per ream for No. 1 white tissue.

Business in book papers is mainly of the small-lot variety. Mills report receiving a good many orders for light tonnage, but there is nowhere near enough business to go around and prices are easy. Some manufacturers are delivering machine finished book paper into New York City at 5.75 cents a pound, and even lower prices have been mentioned in out of the way cases. Fine papers seem to be enjoying a little better demand and quotations have not changed to any important extent.

As the spring draws near, there are signs of more activity in the board market. Paper box manufacturers are beginning to buy in larger amounts, and board prices are fairly well stabilized at about $37.50 f. o. b. New York on plain chip and $45 on solid news board.

Statistics relative to paper production in a yearly review of the industry compiled by the Federal Trade Commission indicate clearly how unsatisfactory a period 1921 proved to be for paper manufacturers. The commission's report shows that a total of 5,356,317 net tons of all kinds of paper and paper board was produced by United States mills last year, representing the smallest year's output of paper during the last five years. In 1920, a total of 7,334,614 tons was produced; in 1919, 6,190,361 tons; in 1918, 6,051,523 tons, and in 1917, 5,919,647 tons.

Localized intensive newspaper campaigns to boom a certain line of paper are becoming increasingly popular with paper mills as they ascertain its value. In Boston, through the medium of three daily papers, the Hampshire Paper Company of South Hadley Falls, Mass., is conducting a three-month advertising effort on Old Hampshire Bond, a nationally known product of this mill. At the same time, the S. D. Warren Company is maintaining a similar advertising drive on its Standard Printing Papers. In both cases there is co-operation between manufacturer and merchant.

ESTABLISHED 1895

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18 East 41st Street NEW YORK, N. Y.
Established 1888

Domestic Raw Materials

Papermaking Rags

Recent trade activity in papermaking rags has chiefly involved several specific grades. Low qualities suitable for roofing felt manufacture have been in fair call, and old whites and a few descriptions of new cuttings have moved in relatively good amounts, whereas most other grades have been largely neglected by buyers. The market as a whole has not shown the scope of activity that characterizes it in livelier times, and consumers with very few exceptions have shown that they are confining their orders almost solely to supplies immediately needed.

The rag situation as it shapes up at present appears rather favorable for the paper manufacturer. There seems to be a plentiful supply of rags of most grades though the comparatively heavy movement of roofing material during the last several months has removed the bulk of such rage held in stock and there is less than the normal accumulation in dealers' and packers' hands at present. The fact should not be lost sight of, however, that spring is approaching and that rag supplies, particularly of roofing grades, always increase substantially during that season. Moreover, reports from Europe are of an encouraging nature to rag consumers in the United States. It is stated on high authority that there are sizeable stores of rags in the various European countries and that all that is needed to bring these supplies out is a little further rise in prices. During the last few months rags shipped from Europe to the American market have come almost entirely from Germany and Holland, while English, French and Belgian dealers are reported accumulating good-sized stocks, having been averse to selling at the prices obtainable from American buyers but showing willingness to dispose of their holdings at slightly advanced prices.

Should consumers suddenly increase the volume of their buying of any grade of rags to any material extent the probabilities are prices on the kind of rags wanted would quickly rise, as the market at the moment is in a rather firm condition with dealers holding stocks for steady prices, which is the usual situation at about this time of the year or toward the end of the winter. It is more than likely, however, that paper manufacturers will continue to exert a cautious policy in the absorption of rag supplies particularly with the spring coming and since demand for most kinds of paper is scarcely large enough to warrant very heavy buying of rag stock.

Roofing rags have eased up in demand to a slight degree during the last few days and quotations are on a little lower level than prevailed about the first of February. New York dealers report sales to felt mills at around 1.15 cents a pound f. o. b. that center for No. 1 roofing, and at an average of 1.05 cents for No. 2 packing, while in the Middle West, 1.25 cents on No. 1 grade and 1.15 cents on No. 2 are about the ruling prices. Foreign dark cottons are bringing between 1.10 and 1.20 cents a pound ex the dock in sales to roofing felt manufacturers.

Prices on most grades of new cuttings evince an easing tendency. This is due both to the limited demand from consuming quarters and also to the larger supply of cuttings owing to clothing manufacturing houses having increased their productive operations. No. 1 white shirt cuttings are readily available at 9.50 to 10 cents per pound, fancy shirt cuttings at 5 cents, light silesias at 5.50 cents, and No. 1 washables at 3.50 cents.

Old whites hold at 5 to 5.50 cents a pound for No. 1 repacked and around 3.50 cents for No. 2 repacked. Thirds and blues are little wanted by paper mills. Average quotations f. o. b. shipping points are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	9.50-10.00
White shirt cuttings, No. 2	5.25- 5.75
Fancy shirt cuttings	5.00-5.25
Washables, No. 1	3.25- 3.50
Unbleached muslins	8.25- 8.50
White lawns	8.00- 8.25
Overall cuttings, blue	5.50- 5.75
Black silesias	3.00- 3.25
Old Stock—	
Whites, No. 1 repacked	5.00- 5.50
Whites, No. 2 repacked	3.25- 3.75
Whites, house soiled	1.60- 1.80
Whites, street soiled	1.40- 1.60
Lace Curtains	4.00- 4.25
Thirds and blues, rough	1.25- 1.40
Thirds and blues, repacked	1.75- 2.00
Black stockings	2.00- 2.25
Cotton canvas, No. 1	3.50- 3.75
White cotton batting	1.75- 2.00
Roofing, No. 1	1.10- 1.25
Roofing, No. 2	1.00- 1.15

Rope and Bagging

Although demand from consuming sources is considerably less than it was up to a few weeks ago, prices on old rope suitable for papermaking are holding fairly steady at the levels reached when the market declined recently. Dealers are asking about 4.50 cents per pound at shipping points for domestic manila rope in No. 1 condition, and while few paper mills show willingness to pay beyond this figure, it can be said that little supply is being obtained at lower levels. Some lots of foreign rope are being sold by importers at around 4.25 cents, and probably at slightly less, but this rope is not considered of as good quality as domestic rope. Old mixed strings are in fair demand and are bringing an average of 90 cents a hundred pounds at shipping points.

A little livelier demand is reported for bagging. Tissue paper manufacturers show more interest and felt paper mills also are absorbing comparatively good supplies. No. 1 scrap bagging is quoted by dealers at 90 cents to $1 a hundred pounds at shipping points, and roofing bagging at 75 to 80 cents. Gunny bagging is in slow demand and easy in price.

Quotations f. o. b. shipping points follow:

	New York and Chicago
Gunny, No. 1 domestic	1.00-1.15
Gunny, No. 1 foreign	.90-1.10
Scrap bagging, No. 1	.90-1.00
Roofing bagging	.70- .80
Wool tares, heavy	1.40-1.60
Wool tares, light	1.20-1.40
Manila rope, No. 1 foreign	4.00-4.25
Manila rope, No. 1 domestic	4.25-4.50
Sisal strings	1.50-1.75
Mixed strings	.85- .95

Old Papers

There is a comparatively good demand for most grades of waste paper; at any rate, consumers are buying in sufficient amounts to maintain prices on rather steady levels, although dealers generally report that the market is not as active as it was a few weeks ago. It would appear that the slowing down of demand for many kinds of new paper and paper board has caused producers to let up in their buying of raw material to an extent, and it is stated that a majority of orders at present call for a smaller tonnage of waste paper than is ordinarily the case. However, there is more or less scarcity of certain grades of old paper, due to the slow operations of print shops, publishing plants and other producers, and this factor serves to offset to a considerable degree the narrower demand for supplies from consuming quarters.

It would appear that prices on waste paper, the better grades especially, are about as high as they can go unless some very radical changes should come about in the paper and pulp industry. White shavings, for example, are bringing prices within close proximity to prevailing wood pulp costs, and old kraft paper, white news cuttings and flat stock are selling at prices which seem high in comparison with current prices on pulp for which these grades of paper stock are substitutes. Of course, should pulp values rise, waste paper prices would likely advance in similar proportion, or should there be a sudden run of demand on any grade of old paper, prices would doubtless be elevated, but if the market continues on about its present even keel the probabilities would seem to favor a slight easing of prices as

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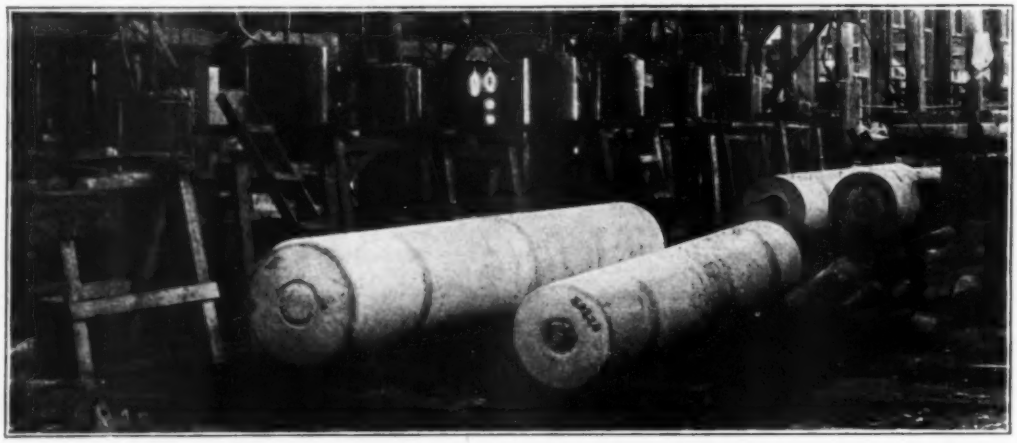

If your Paper Machines are not equipped with Press Rolls of BARRE GRANITE you are not getting the results that you should get, for it is a recognized fact that granite rolls are much superior to any others and Barre Granite the best of all. Let us tell you about them.

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Steel fittings made for your individual requirements. Valves for pulp lines in stock at all times.

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supplies of old paper become larger, since general business conditions are improving and more new paper is being used and therefore more waste paper being produced.

Hard white shavings of No. 1 quality are selling at an average of 4 cents per pound at shipping points, and No. 1 soft white shavings are quoted by dealers at between 3.25 and 3.50 cents, with the latter grade in relatively better demand than the former. Heavy No. 1 book stock is bringing 1.40 to 1.60 cents a pound, ledger stock around 1.80 cents, old No. 1 kraft 1.90 cents, white news cuttings 1.85 cents, and No. 1 manilas close to one cent per pound. In the east, folded newspapers are quoted at 60 cents a hundred pounds f. o. b. shipping points and in the West at $1 to $2 a ton above this figure, while No. 1 mixed paper is bringing from 47½ to 57½ cents a hundred.

Quotations f. o. b. shipping points are as follows:

	New York and Chicago
Hard white shavings, No. 1	3.90 -4.15
Hard white shavings, Nos. 2-3	2.75 -3.25
Soft white shavings	3.25 -3.50
Colored shavings	1.50 -1.75
Heavy book, No. 1	1.40 -1.60
Crumpled book, No. 1	1.10 -1.20
Ledger stock	1.75 -1.85
Kraft No. 1	1.85 -2.00
Manilas, No. 1	.90 -1.00
White blank news	1.80 -1.90
Overissue news, No. 1	.80 - .90
Folded news	.60 - .70
Mill wrappers	.70 - .80
Box board cuttings	.55 - .65
Mixed paper, No. 1	.47½- .57½
Common paper	.30 - .40

Chemical Pulp

The market for domestic wood pulp is in a generally quiet condition with business of spotty character. Paper makers are coming into view as buyers only when in immediate need of supplies and even then are limiting orders to supplies actually and directly required. Reports from some corners of the trade are to the effect that demand has slowed down to a very considerable degree, yet in other quarters it is stated that, on the whole, a fair movement of supplies is being accomplished. At any rate, the quieter position of the paper market in recent weeks has been clearly reflected in the wood pulp trade, and paper mills as a general thing seem to be getting along with contract commitments of pulp without having to resort to much buying in the open market.

Prices as a rule are moderately well maintained though there has been a little softening of values on some grades. Domestic producers seem to be exerting every effort to maintain quotations, but the slower demand, coupled with rather heavy offerings of foreign pulp, have unquestionably made for an easier market tone. Sulphite shows little change, with leading domestic manufacturers still quoting 5 to 5.25 cents a pound at pulp mills on No. 1 bleached sulphite, and 2.75 to 3 cents on No. 1 unbleached. News grade sulphite is steady at about 2.50 cents and apparently is favored with relatively as broad a demand as any other grade of wood pulp. Kraft is easy and most consumers are reported filling their requirements at around 2.75 cents for No. 1 quality kraft, while soda pulp displays a weakening tendency with quotations ranging around 4 cents per pound.

F. O. B. pulp mill prices are:

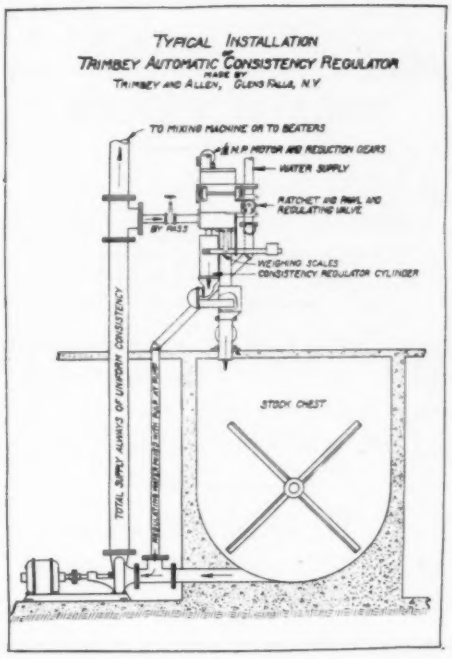
Bleached sulphite	5.00-5.25
Easy bleaching sulphite	3.00-3.25
Unbleached sulphite, No. 1	2.75-3.00
News grade sulphite	2.40-2.65
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.50-3.75
Kraft, No. 1	2.75-3.00
Screenings, refined	.80-1.00

Mechanical Pulp

In keeping with most other raw materials used in the manufacture of paper, mechanical pulp has eased off in demand to an extent, there having been a noticeable decrease in buying by some consumers. Newsprint mills are absorbing ground wood in comparatively good tonnage, and there is also a fair routine demand from box board plants, but other consumers are purchasing in slight amounts. It is also reported that water conditions in grinding districts have improved substantially, thus leading to a larger output of ground wood and contributing to the softer market tone.

Quotations continue to range around $32 a ton, on an average, for prime spruce ground wood at grinding mills in Upper New York State and New England. Canadian pro-

Why Guess at Consistencies?



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It will hold stock at a maximum variation of less than 0.2% consistency as pumped to mixers or beaters.

It removes the main cause of uneven weights.

The Paper Mill Superintendent of Laurentide Company, Ltd., writes:

"There is no question but what the control of the consistency of the Groundwood and Sulphite is responsible in a large measure for our successful running at high speed."

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Our Line Includes:

Trimbey Automatic Consistency Regulators.

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This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

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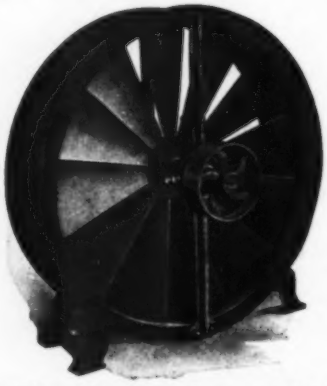

The Knowlton Multiblade Fans are the best that can be obtained for paper mill ventilating because they are exceedingly rugged—perfectly balanced and the air capacity is exceptionally large.

Sizes in Stock 32 inch, 40 inch, 48 inch
Any other size built to order
Either Belt or direct connected Motor Drive

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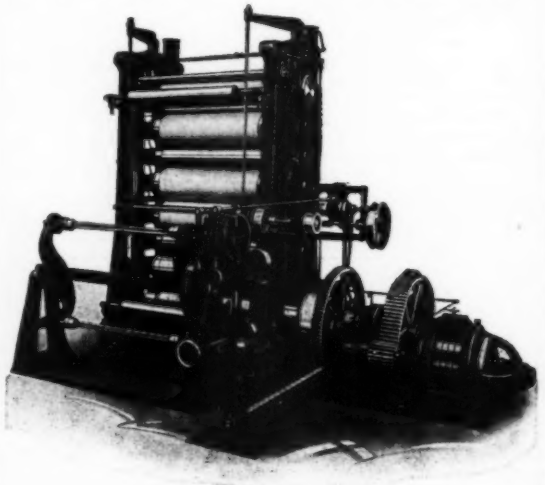
KNOWLTON MACHINE CO.
Established 1864
WESTBROOK MAINE

NORWOOD
SUPER CALENDERS



WE ARE SPECIALISTS IN
Paper Finishing Machinery

NORWOOD ENGINEERING CO.
FLORENCE, MASS., U. S. A.

ducers are reported selling ground wood down to $27 a ton, but the extra freight brings the cost of this pulp to United States consumers up to about the same level as domestic ground wood, the delivered consuming mill basis ranging between $40 and $42 a ton. A moderately large trade is said to be passing in ground wood brought down from Canada by schooners to New York and distributed from that port by rail among various eastern users.

Chemicals

There is a fair movement of papermaking chemicals in small lots and contract business is also of moderate dimensions, yet consumers are noticeably restricting the volume of their buying. Quotations have undergone little change of note. Casein evinces a firming tendency, with 9 cents per pound the average price quoted at present, while bleaching powder rules steady at about 2 cents a pound, with importers shading this figure in some cases.

Quotations are as follows:

Alum, lump ammonia	3.60- 3.75
Alum, lump starch	4.00- 4.25
Blanc fixe, powdered	3.25- 3.75
Bleaching powder (domestic drums)	2.00- 2.50
Brimstone (long ton, at mine)	16.00-17.50
Casein	8.50- 9.50
Caustic soda, spot delivery	3.50- 3.75
China clay, domestic washed	8.00-10.00
China clay, foreign	13.00-18.00
Rosin, grade E	5.45-
Satin white	2.00- 2.25
Soda ash, 58 per cent light (bags)	1.75- 2.00
Sulphite of alumina, commercial grade	1.50- 1.65
tarch, papermakers', in bags	1.95- 2.00
Talc (ton)	11.00-12.00

Foreign Trade Opportunities

A commercial agency firm in India desires to secure the representation of paper manufacturers. Quotations should be given c. i. f. Calcutta. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 780.

A firm of commission merchants and importers in Egypt desire to secure an agency and purchase writing, wrapping and other papers. Quotations should be given c. i. f. Egyptian port. Payment: Cash against documents. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D.C., referring to Inquiry No. 807.

Salesmen Complete Program

Tuesday evening, April 11, will be the big festival of the salesmen of the paper industry.

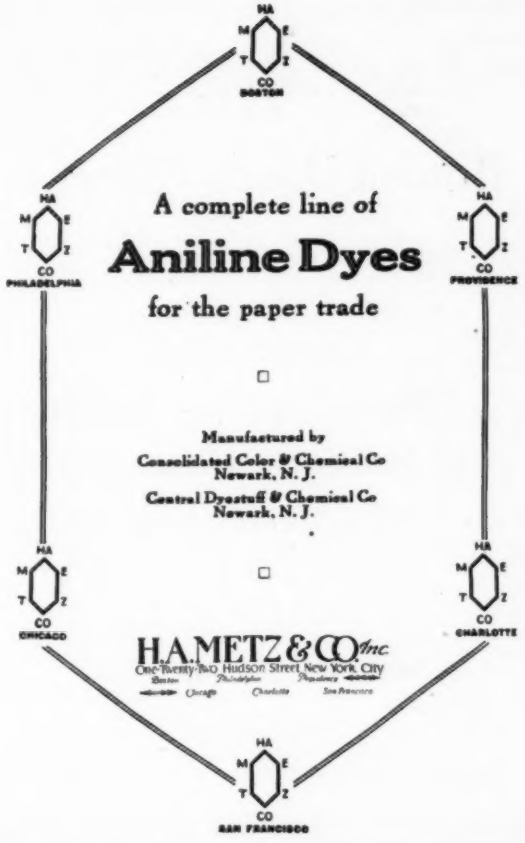
A dinner-dance, with a noted speaker as the banquet guest, and ladies as the guests of the members will be the wind-up event of the program, for which special committees have been named, and it is planned to make these affairs for the women of the industry a feature of both the annual convention henceforth and of the fall business conference as well.

The committees for the convention have been selected in skeleton form, each chairman being authorized to select his co-workers. The four committees will be headed as follows:

Reception Committee—George K. Gibson, Chicago.
Hospitality Committee—G. H. Abernethy, New York.
Banquet Committee—L. B. Steward, New York.
Membership Committee—Walter E. Perry, Holyoke, Mass.

These plans for the annual meeting were perfected during a special luncheon called by Secretary Baker, when National President H. H. Reynolds of Housatonic, Mass., came to the city to meet the New York salesmen. The result of this luncheon was not alone the decision on details for the annual program, however.

The New York salesmen will hereafter hold a monthly luncheon like that already in vogue at Chicago, and all visiting members of the association will be invited to attend. The next New York luncheon will be held Wednesday, March 29, to complete plans for the convention, and thereafter the meetings will be held on the fourth Wednesday of each month. The Chicago luncheons are the second Monday of each month, and the dates were so set that salesmen on the road may be able to attend both luncheons the same month.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Corrugated
Fibre Shipping Boxes
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Made from spruce
grown in the forests
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NEW YORK OFFICE: 291 BROADWAY

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White rag	15-40
White sulphite, No. 1	10-20
Colored	12-40
Ledger—	
White rag	15-50
White sulphite	12-25
Colored sulphite	10-00
Colored rag	10-00
Bonds—	
White rag	13-40
White sulphite	9-20
Colored sulphite	10-25
Colored rag	14-40
Book—	
No. 1 S. & S. C.	6.50- 7.00
Machine finished	5.75- 6.50
English finished	6.00- 6.75
Coated and enameled	8.00- 9.50
Lithograph, M. F.	9.00-12.00
Newsprint—	
Rolls, contract	3.50-
Rolls, transient	3.50-3.75
Sheets	4.00-4.25
Side runs	3.25-3.50
Cover Stock—	
Coated, both sides	9.25-
Coated, one side	9.20-
Tissue—	
No. 1 white, 20x30	.90-1.00
No. 2 white, 24x36	.80- .90
No. 1 manila, 24x36	.80- .90
Kraft	1.00-1.25
Wrappings—	
No. 1 kraft	6.75-7.50
No. 2 kraft	5.75-6.50
Boards—	New York and Chicago
Solid news	42.50-45.00
Straw	45.00-50.00
Plain chip	37.50-40.00
White coated chip	60.00-70.00
Manila coated chip	55.00-60.00
Binders' board	70.00-80.00

Vigorous Fight Made by Geo. W. Sisson, Jr., on National Forestry Policy

A vigorous fight was made by George W. Sisson, Jr., former president of the American Paper and Pulp Association, in an effort to prevent a mandatory forestry policy report from the recent Agricultural Conference at Washington through the organization of a committee which might from its make up be suspected of having been intended to drive through a recommendation for radical legislation.

The fight was successful to the extent that the proposed program was greatly modified, and the final report to the general conference, while emphasizing strongly the need for a national forestry policy, did not include the proposal to impose federal mandatory control upon the owners of private timberlands.

Mr. Sisson was present at the conference as former president of the New York State Agricultural Society, and a prominent figure in the Jersey cattle breeding industry, and was placed upon the forestry committee because of his place as chairman of the Forestry Committee of the American Paper and Pulp Association. He spoke strongly in behalf of the paper industry and timberland owners, in repudiating the charge that they were ruthless devastaters of forest land.

The committee on a National Forestry Policy was headed by Gifford Pinchot of Pennsylvania, and consisted of eighteen members, of whom two were women, admittedly unfamiliar with the subject. Two were dairymen, one an agricultural editor, one a state geologist, one a former Assistant Secretary of Agriculture, two members of the Farmers' Union, noted for its radical tendencies, and one United States Senator, Mr. Capper, sponsor for Mr. Pinchot's bill for mandatory legislation on forestry. Four professional foresters were on the committee, two of whom in addition to the chairman, are known as devotees of the idea that the federal government has the right to dictate how a man shall handle private property, over-riding the authority of the states in which the forest land may be located. One of the committee was a representative of the Chamber of Commerce of the United States, and with Mr. Sisson and a western lumberman made up the group of practical operators of forest lands.

If any further suggestion were needed that the committee was not made up in an effort to make an impartial study of the situation, it might be pointed out that four of the committee are from Pennsylvania, and the Chief Forester of the United States, Col. W. B. Greeley, who is opposed to mandatory federal legislation, was not a member of the committee.

At the first meeting of the committee a tentative report, prepared in advance by Mr. Pinchot, Rafael Zon of the Forest Service and Prof. Filibert Roth of Michigan, was submitted and it was sharply criticized as making sweeping statements resulting more from prejudice than from actual knowledge and in general distinctly antagonistic to the holder of private forest lands. As a result of this criticism, a much saner report was finally adopted than was originally proposed.

It was somewhat significant that with an administration professedly standing against less government in business, a national conference should have for its forestry committee a group so representative of the element which is endeavoring to force the enactment of a type of legislation which, if not actually socialistic, is intended to be oppressive upon the business of the country, and there was considerable curosity as to the means taken to persuade Secretary of Agriculture Wallace to name such a committee.

After this conference, when the committee of paper manufacturers was in Washington at Secretary Hoover's invitation, a committee also called upon Secretary Wallace to express approval of the work being done by the Forest Service, to state the interest of the industry in the forestry problem, and its willingness to do its share in solving the problem, but to register opposition to mandatory federal legislation. Since that visit the sentiment of the committee has been sent to Secretary Wallace in a letter from Dr. Baker, Secretary of the Association, stating that the paper industry stands for cooperation between federal and state authorities and private owners in the settlement of this question.

John Balch Now Associated with Horace P. Griffith & Company

Mr. John Balch, who is well known in cost circles throughout the paper industry, has recently become associated with Horace P. Griffith & Company, Certified Public Accountants, Philadelphia.

Mr. Balch was for a number of years Cost Accountant for the Chemical Paper Mfg. Co. of Holyoke, Mass., and was the first secretary of the Connecticut Valley Branch of the Cost Association of the Paper Industry. He has been a valuable contributor toward the advancement of better accounting in the paper industry, and has always been active in the association work.

The general Cost accounting and installation work of Horace P. Griffith and Company will be handled by Mr. Balch under the direct supervision of the members of the firm, and with the broad knowledge of cost work and very intimate knowledge of the problems attending Paper and Paper Board Cost Accounting which Mr. Balch possesses, we believe that he will be a most valuable addition to the staff of his present associates.

Mr. Balch is to be congratulated on his association with a firm of such high standing in the profession, and we, among the many friends in the paper industry, wish to extend to him our hearty congratulations and good wishes.

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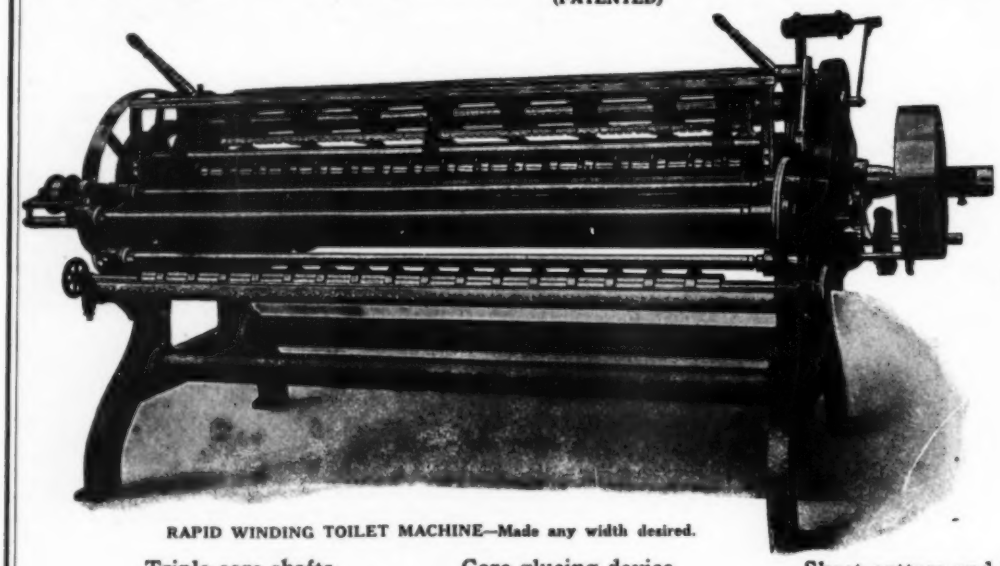

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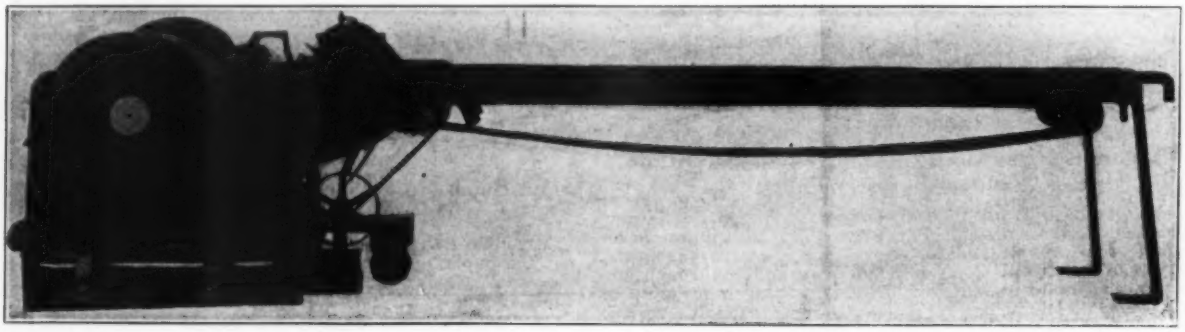

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Wood Pulp

The market in the United States for imported wood pulp has developed a distinctly easier undertone. The reasons for this are several. Probably the most important is that demand for most grades of pulp has slowed down, paper manufacturers as a general thing having let up in their buying because of smaller requirements under the present rate of mill operations, increased offerings of pulp and the approach of spring. Another reason is the self-apparent increase in the available supply of pulp. Shipments from Europe to this market have been exceptionally large during the last several months. As an instance of this, government figures show that a total of well over 100,000 tons of chemical wood pulp were imported into the United States in December, which is far above the tonnage usually considered as normal. Before the war, U. S. imports of chemical pulp seldom amounted to more than 40,000 tons in any one month, while between 30,000 and 35,000 tons was generally viewed as an average month's supply from foreign sources. With so much pulp coming into the market, it is but natural that some dealers and importers have made extra effort to effect sales, and the consequent selling pressure is but another reason for the softer market position. Still another reason is the sentiment existing among paper manufacturers that pulp prices are higher than they should be notwithstanding the rather sharp declines during the readjustment period of the past year, and expectation that the market will seek lower levels in the spring when larger pulp supplies become available. All of these factors encourage consumers in this country to limit their buying almost solely to pulp directly needed, and while it can be said that current demand is of a very healthy character in that it is against actual and immediate requirements, it must also be said that the volume of demand is nowhere near what it customarily is.

Reports from primary sources in Europe are of comparatively bullish nature. Production in the Scandinavian countries is said to be far under normal, while less supply of pulp is said to be available in Germany than in some time, the German Government having imposed restrictions on the export of pulp and the severely cold weather in Northern Europe having seriously hampered shippers in Germany and Sweden and Norway in dispatching supplies to the American market. Paper manufacturers in this country, however, contend that, judging from the figures relative to importations into the United States in recent months, the reported unfavorable conditions abroad do not appear to be preventing European producers from sending abnormally large amounts of pulp to this market, and that as long as imports continue as heavy as they have been lately there is no justification for them to increase their buying beyond immediate requirements.

As regards quotations, probably the most interesting development has been a softening of prices on kraft pulp. Most sales of Scandinavian kraft are reported negotiated at present at around 2.65 cents per pound ex dock New York or other American ports. There have been reports of some kraft pulp being sold at under this level, though importers generally ask at least this figure for No. 1 quality kraft. Sulphite prices hold fairly steady. Bleached sulphite of No. 1 grade is selling at 4.25 to 4.50 cents a pound on the dock, No. 1 unbleached at around 2.75 cents, and easy bleaching at 3 to 3.25 cents. Foreign ground wood is quoted at from $34 upward per ton ex dock.

Receipts at the port of New York in February and current market quotations follow:

Bleached sulphite, No. 1	$ 4.25-$ 4.50
Unbleached sulphite, No. 1	2.65- 2.90
Easy bleaching	3.00- 3.25
Mitscherlich unbleached	3.00- 3.25
Kraft	2.60- 2.85
Ground wool, per ton	34.00-

E. M. Sergeant & Co., 700 bls. from Hamburg; Maurice O'Meara Co., 21 bls. from Hamburg; Central Union Trust Co., 1,600 bls. from Christiania; United States Lines, 7,075 bls. from Bremen; Castle, Gottheil & Overton, 1,625 bls. from Bremen and 1,125 bls. from Hamburg; A. Kramer & Co., 929 bls. from Bremen; Guaranty Trust Co., 884 bls. from Hamburg; E. J. Keller Co., 5,645 bls. from Ornskoldsvik; American Woodpulp Corp., 9,000 bls. from Hamosand and 1,000 bls. from Sundsvall; Irving National Bank, 64 bls. from Hamburg; Brown Bros. & Co., 10,821 bls. from Hamburg; National Bank of Commerce, 5,571 bls. from Hamburg and 2,500 bls. from Sunsvall; A. J. Pagel & Co., 3,000 bls. from Hallwik; Fred Enders & Co., 3,675 bls. from Hallwik and 525 bls. from Hamburg; Scandinavian-American Trading Co., 1,500 bls. from Norrkoping; H. Hollesen, 3,750 bls. from Bremen; Lagerloel Trading Co., 2,735 bls. from Kotka; Tidewater Paper Mills Co., 8,122 bls. ground wood from Liverpool, N. S.; M. Gottesman & Co., 1,059 bls. from Rotterdam; Whalen Pulp and Paper Co., 9,690 bls. from Vancouver; J. Andersen & Co., 1,200 bls. from Christiania; Equitable Trust Co., 1,000 bls. from Hamburg; Order, 975 bls. from Hamburg, 11,741 bls. from Ornskoldsvik, 21,660 bls. from Hamosand and 250 bls. from Kotka.

Paper Stock

Receipts of papermaking materials other than wood pulp of foreign origin into the United States were moderately large during February though not approximately in tonnage the imports of a few months ago. A quieter demand from paper mills in this country causes importers to be more cautious in purchasing supplies from Europe, and the rather high prices asked by dealers abroad also serve to hold importations down to an extent. The German Government has placed restrictions on the export of papermaking rags, which also probably has reduced the total shipments from Europe to the U. S. to no small degree. It is stated that a maximum of 27,500 tons of rags per month will be permitted to leave Germany under the export regulations, which tonnage is undoubtedly a good deal less than has been shipped even to America prior to the imposing of export restrictions in Germany.

Imports of old rope dropped off in February, reflecting the narrower demand for this material from American paper mills, and old bagging was received in but light amounts. Rag importations were fair but apparently of smaller total tonnage than in some months. Arrivals through the port of New York in February follow:

Old Rope

First National Bank of Boston, 146 coils and 174 bls. from Antwerp, 142 coils from Hamburg, 142 coils from Rotterdam and 100 coils from Genoa; Brown Bros. & Co., 221 coils from Bristol and 339 coils from Hull; N. E. Berzen, 90 coils from Hull; J. Perlman, 42 coils from Havana; E. J. Keller Co., 167 coils from Rotterdam; United States Lines, 234 coils from Bremen; Bemis Bro. Bag Co., 29 bls. from Barcelona; Equitable Trust Co., 85 coils from Rotterdam; Pollack Bros., 6 coils from Rotterdam; Katzenstein & Keene, 183 coils from Rotterdam; Atlantic National Bank, 105 bls. from Marseilles; International Purchasing Co., 44 coils from Havre; Order, 157 coils from Bristol, 70 bls. from Antwerp and 71 coils from Havre.

Old Bagging

E. J. Keller Co., 483 bls. from Havre, 113 bls. from Hamburg and 94 bls. from Rotterdam; Equitable Trust Co., 74 bls. from Antwerp; Irving National Bank, 112 bls. from Manchester; Order, 158 bls. from Liverpool and 205 bls. from Antwerp.

Rags

Arrowhead Mills, 192 bls. from Bremen; American Woodpulp Corp., 50 bls. from Hamburg; United States Lines, 2,841 bls. from Bremen; F. P. Gaskell & Co., 387 bls. from Bremen and 187 bls. from Hamburg; Chemical National Bank, 727 bls. from Bremen; Viamond State Fibre Co., 32 bls. from Bremen; E. J. Keller Co., 168 bls. from Havre, 66 bls. from Algiers, 728 bls. from Hamburg and 38 bls. from Rotterdam; Goldman, Sachs & Co., 326 bls. from Bordeaux and 117 bls. from Havre; Irving National Bank, 66 bls. from Hamburg; International Acceptance Bank, 30 bls. from Hamburg; Albion Trading Co., 25 bls. from London and 60 bls. from Liverpool;

Wax Paper Coating Machines

Carbon Paper Coating Machines
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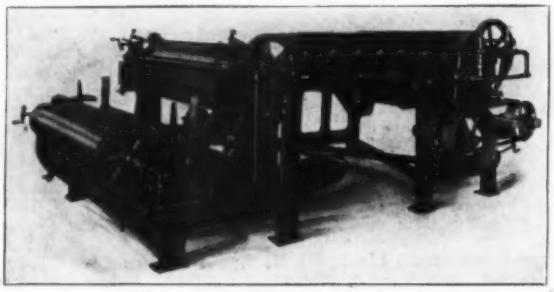

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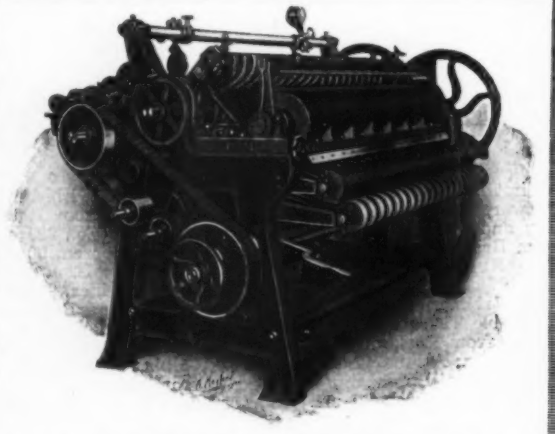

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Atlantic National Bank, 42 bls. from Antwerp; Castle, Gottheil & Overton, 505 bls. from Antwerp, 1,009 bls. from Rotterdam and 627 bls. from Hamburg; W. Hughes & Co., 459 bls. from Havre and 112 bls. from Rotterdam; State Bank of New York, 92 bls. from Hamburg; Katzenstein & Keene, 139 bls. from Antwerp; George W. Millar & Co., 321 bls. from Rotterdam; R. F. Downing & Co., 231 bls. from Bremen; Ladenburg, Thalman & Co., 105 bls. from Liverpool, 541 bls. from Hamburg and 375 bls. from Antwerp; Bankers Trust Co., 776 bls. from Liverpool; Guaranty Trust Co., 1,456 bls. from Liverpool and 175 bls. from Hamburg; Coal & Iron National Bank of Philadelphia, 866 bls. from Hamburg; Corn Exchange National Bank of Philadelphia, 121 bls. from Hamburg; H. Reed, 41 bls. from Hamburg; Maurice O'Meara Co., 292 bls. from Hamburg; Wilkinson Bros. & Co., 34 bls. from Rotterdam; M. Frank & Co., 38 bls. from Rotterdam; Chase National Bank, 42 bls. from Hamburg; Order, 437 bls. from Havre, 15 bls. from Bordeaux, 196 bls. from Hamburg, 65 bls. from London and 45 bls. from Bombay.

Miscellaneous Paper Stock

E. J. Keller Co., 408 bls. from Antwerp and 31 bls. from Glasgow; Ladenburg, Thalman & Co., 118 bls. from Glasgow and 53 bls. from Hamburg; Irving National Bank, 157 bls. from Antwerp and 62 bls. from Hamburg; American Exchange National Bank, 67 bls. from Manchester.

Paper

Shipments of newsprint, chiefly from Germany and Scandinavia, continue to feature the import trade in paper of the United States. Imports of newsprint during February were well up on a parity with the several preceding months though, judging from the manifests of steamers discharging at the port of New York, receipts last month were no larger than have been coming into the country for some time. A significant feature is the large supply of foreign newsprint that is being received by a certain publisher of newspapers in New York Chicago, and other cities.

Importations of wrapping paper, particularly from Sweden, appear to be on the rise, several sizable shipments being received in February. Cigarette paper imports continue of normal volume, and hanging paper and paper boards are being received in comparatively good amounts from foreign sources. Arrivals at the port of New York in February follow:

Cigarette

American Tobacco Co., 1,104 cs. from Bordeaux; British-American Tobacco Co., 59 cs. from Liverpool; P. Lorillard Co., 28 cs. from Marseilles; Rose & Frank Co., 51 cs. from Havre; Gluckmann & Strauch, 4 cs. from Bordeaux; A. Alexandre, 2 cs. from Bordeaux; H. H. Strauss, 3 cs. from Bordeaux; Surbrug Co., 26 cs. from Havre; Southern Pacific Co., 3 bls. from Havre; P. J. Schweitzer, 50 cs. from Barcelona; Order, 40 cs. from Barcelona.

Printing

Republic Bag & Paper Co., 479 rolls from Hamburg; F. B. Vandegrift & Co., 122 cs. from Hamburg; Perkins-Goodwin Co., 25 cs. from Genoa; E. Dietzgen & Co., 7 cs. from Hamburg; Parsons & Whittemore, 16 rolls from Rotterdam; New York Tribune, 443 rolls from Christiania; Central Union Trust Co., 223 rolls from Hamburg; Gerhard & Hey, 35 rolls from Hamburg; J. J. Nolan, 443 rolls from Christiania; C. B. Hewitt & Co., 20 rolls from Christiania; New York American, 7,246 rolls from Hallstavik and 2,778 rolls from Norrkoping; G. W. Sheldon & Co., 310 cs. from Bremen; C. H. Young Publishing Co., 191 rolls from Bremen and 148 rolls from Kotka; Chemical National Bank, 232 rolls from Bremen and 323 rolls from Hamburg; F. L. N. Smythe Co., 57 cs. from Hamburg; Corn Exchange Bank, 161 rolls from Copenhagen and 94 rolls from Christiania; E. C. Melby, 147 rolls from Copenhagen; Henry Lindenmeyr & Sons, 25 cs. from Callao; C. L. Robinson, 39 rolls from Hamburg; Atlantic National Bank, 1,315 rolls from Hamburg and 18 bls. from Bremen; D. S. Walton & Co., 775 rolls from Hamburg and 870 rolls from Norrkoping; Equitable Trust Co., 1,716 rolls from Hallstavik; Irving National Bank, 207 rolls from Sundsvall; American Woodpulp Corp., 376 rolls from Sundsvall; P. C. Zuhlke, 331 cs. from Antwerp; G. Gennert, 2 cs. from Hamburg; Maurice O'Meara Co., 484 rolls from Brevik; Haring Paper Corp., 1,413 rolls from Brevik and 630 rolls from Christiania; Globe Shipping Co., 147 cs. from Bremen; Virginia Paper Co., 368 rolls from Helsingfors; Agros Corp., 580 rolls from Helsingfors; New York Globe, 117 rolls from Kotka and 142 rolls from Christiania; Street & Smith Publishing Co., 50 rolls from Kotka; Irving National Bank, 345 rolls from Kotka; Order, 719 rolls from Hamburg, 1,100 rolls

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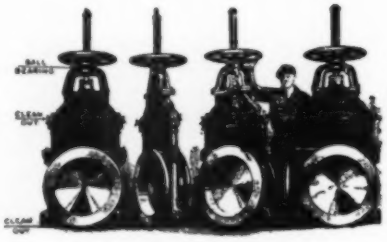

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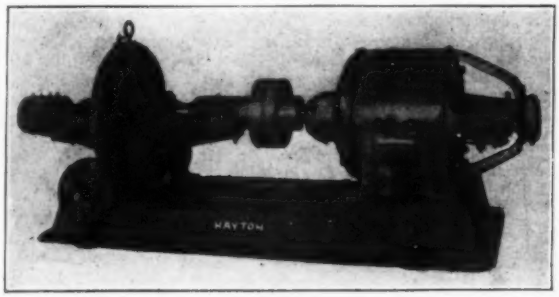

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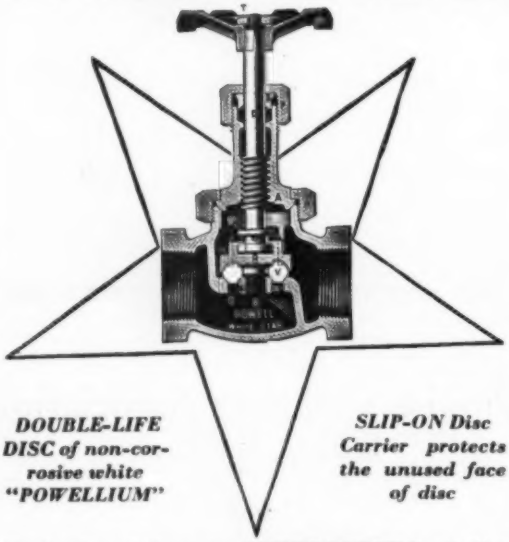

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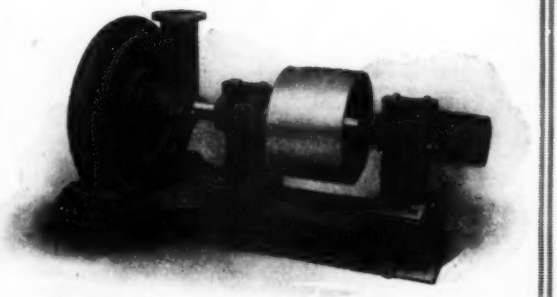

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from Christiania, 1,787 rolls from Copenhagen, 11 bls. from Brevik, 6,300 rolls from Kotka, 190 rolls from Liverpool and 690 rolls from Bremen.

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Republic Bag & Paper Co., 4,468 rolls from Hamburg and 1,209 rolls from Liverpool; D. S. Walton & Co., 283 bls. and 288 rolls from Gothenburg and 1,596 rolls and 21 bls. from Liverpool; Blauvelt-Wiley Paper Co., 27 bls. from Glasgow; Philadelphia National Bank, 25 rolls from Hamburg; Ladenburg, Thalman & Co., 1,026 bls. from Hamburg; Guaranty Trust Co., 973 bls. from Hamburg; F. L. N. Smythe Co., 97 rolls from Hamburg; V. Touri, 109 rolls from Piraeus; Order, 509 rolls from Hamburg and 23 cs. from Liverpool.

Hanging

Prager Co., 8,164 rolls from Antwerp; E. G. Higgins & Co., 5 cs. from Antwerp; Happel & McAvoy, 2 cs. from Hamburg; W. H. S. Lloyd & Co., 170 bls. from London; A. Murphy & Co., 48 bls. from Liverpool and 4 bls. from London; A. C. Dodman, Jr., 10 bls. from Liverpool and 16 bls. from Antwerp; Pitt & Scott, 11 bls. from Havre; R. F. Downing & Co., 25 cs. from Yokohama and 31 pkgs. from London; National City Bank, 17 bls. from Liverpool; Order, 11 cs. from Yokohama and 6 bls. from London.

Writing

Philadelphia National Bank, 92 cs. from Hamburg; Judson Freight Forwarding Co., 2 cs. from Havre; Republic Bag & Paper Co., 449 rolls from Hamburg; New Jersey Worsted Spinning Co., 3 cs. from Bremen; Irving National Bank, 31 cs. from Antwerp.

Drawing

Favor, Ruhl & Co., 6 cs. from London and 8 cs. from Havre; Gruner & Reinhardt, 21 cs. from Hamburg; Keuffel & Esser Co., 236 rolls from Hamburg and 28 cs. from Rotterdam; E. Dietzgen & Co., 36 cs. from Hamburg; New York Blue Print Paper Co., 5 cs. from Hamburg; Japan Paper Co., 59 cs. from Yokohama; Order, 5 cs. from Hamburg.

Filter

J. Manheimer, 181 bls. from Bordeaux; E. Fougera & Co., 113 cs. from Bordeaux; Hensel, Bruckmann & Lorbacher, 3 cs. from Hamburg; Lunham & Moore, 6 cs. from Rotterdam; A. Giese & Son, 17 bls. from Bordeaux.

Tissue

Wilkinson Bros. & Co., 20 bls. from Liverpool; R. Hoe & Co., 5 bls. from London; M. Snedeker Corp., 13 cs. from Liverpool; Meadows, Wye & Co., 9 cs. from Liverpool.

Boards

Prager Co., 29 cs. from Bremen; Metropolitan Importing & Mfg. Co., 48 cs. from Bremen and 15 cs. from Hamburg; W. B. Wheeler Corp., 100 cs. from Bremen; Hermes Bros., 3 cs. from Hamburg; Lindt Chocolate Co., 4 cs. from Hamburg; Eastern Calendar Co., 4 cs. from Hamburg; Phoenix Shipping Co., 2 cs. from Hamburg; Alpers & Mott, 22 cs. from Bremen; Bendix Paper Co., 87 cs. from Bremen and 14 cs. from Hamburg; Hague & Co., 3 cs. from Bremen; Maurice O'Meara Co., 76 rolls from Rotterdam; Henry Lindenmeyr & Sons, 4 cs. from Callao; Globe Shipping Co., 5 cs. from Hamburg and 26 cs. from Bremen; Wiebusch Calendar Importing Co., 3 cs. from Hamburg; American Express Co., 16 cs. from Hamburg; United States Forwarding Co., 25 cs. from Bremen; Order, 229 cs. from Rotterdam.

Miscellaneous

Guaranty Trust Co., 26 cs. from Bremen; R. F. Downing & Co., 2 cs. from Hamburg; Hensel, Bruckmann & Lorbacher, 12 cs. from Hamburg; United States Forwarding Co., 3 cs. from Hamburg; T. D. Downing & Co., 3 cs. from Hamburg; W. Heuerman, 2 cs. from Antwerp; E. Daiber, 10 cs. from Antwerp; American Shipping Co., 3 cs. from Hamburg; A. Frankan & Co., 5 cs. from Hamburg; Perkins-Goodwin Co., 6 cs. from Genoa; F. L. Kraemer & Co., 16 cs. from London; Japan Paper Co., 15 cs. from Yokohama; C. B. Richard & Co., 72 cs. from Havre; W. J. Byrnes & Co., 7 cs. from Havre; Sinclair & Valentine, 7 cs. from Hamburg; International Forwarding Co., 2 cs. from Liverpool; E. H. Danziger & Co., 15 cs. from Hamburg; A. Lamb, 69 cs. from Hamburg; Astra Salas & Co., 20 cs. from Callao; Herman Lips, 4 cs. from Havre; Foreign Import Co., 2 cs. from Havre; Judson Freight Forwarding Co., 12 cs. from Havre; Birn & Wachenheim, 15 cs. from Antwerp; Defender Photo Supply Co., 32 cs. from Antwerp; S. Mason, 7 cs. from Danzig; American Express Co., 8 cs. from Hamburg; Richardson Bros., 39 cs. from Hamburg and 10 cs. from Liverpool; J. B. Harris, 115 rolls from Hamburg; Globe Ticket Co., 111 bls. from Hamburg; S. S. Alcorn, 48 cs. from Hamburg; Overseas Importing Co., 92 bls. from Hamburg; Baer Bros., 5 cs. from Bremen; Order, 39 cs. from Hamburg, 66 cs. from Bremen and 6 cs. from Genoa.

Remember

WM. A. HARDY & SONS

FITCHBURG, MASS.

Originators and Oldest Manufacturers

OF THE

Cast Bronze Screen Plate

ALSO SPECIALIZE IN

Acid Resisting Digester Parts

UNION SCREEN PLATE CO.

Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada

UNION BRONZE SCREEN PLATES

(Best phosphorized Cast Metal)

Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed

The Witham Screen Plate Fastener, Patented

THE ORIGINAL THE BEST

SCREEN PLATES *and* DANDY ROLLS

Watermarking a Specialty

Central Manufacturing Co.

The Quick Service House

KALAMAZOO MICHIGAN

Ticonderoga Machine Works

TICONDEROGA, N. Y., U. S. A.

MANUFACTURERS OF

WARREN IMPROVED CALENDER DOCTORS

With Flexible Blades, Universal Adjustment and Control
(PATENTED)

WARREN IMPROVED PATENT DOUBLE DRUM WINDERS

Patent BALL VALVE Hydrant
Stock Circulating Systems *and*
other Paper Mill Specialties

SEND FOR OUR BULLETIN

Important Notice

The undersigned have organized the corporation of

Coy, Disbrow & Co., Inc.

309-311 Canal Street **New York City**

Paper Merchants

HAMILTON T. DISBROW
President
Formerly Coy, Hunt & Co.

CHARLES E. ROBERTSON
Vice President
Bellows Falls, Vermont

ROBERT H. COY
Treasurer
Formerly Coy, Hunt & Co.

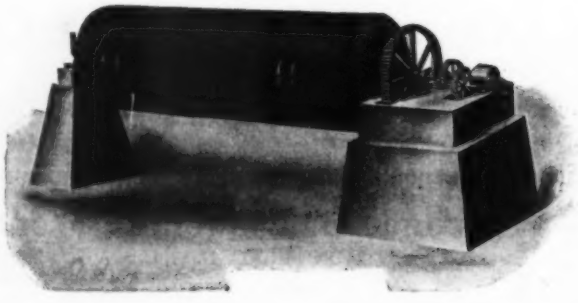
FRED J. PERRY
Vice President
President Coy Paper Company
Claremont, N. H.

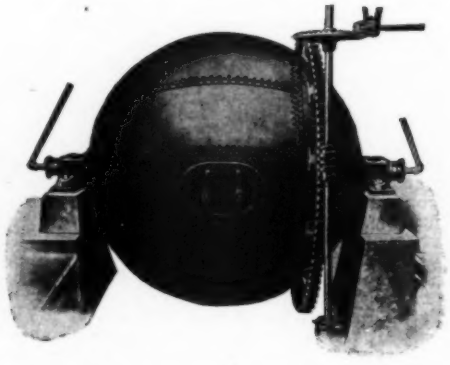
WILLIAM E. EBBETS
Secretary and General Manager

We cordially invite our mill friends to communicate with us concerning the distribution of their paper through our organization composed of men of long standing in the paper industry.

BIGGS

Globe and Cylinder Rotary Bleaching Boilers





Biggs Rotaries have been adopted as standard equipment since 1887. Let us figure on your next installation.

We specialize in Steel Storage and Pressure Tanks, and general steel plate construction for the paper trade.

The Biggs Boiler Works Company

Seneca Place and Case Ave. **AKRON, OHIO**

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ADHESIVES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

ACID RESISTING BRONZE
William A. Hardy & Sons, Fitchburg, Mass.

ACID RESISTING PAINT
E. I. Du Pont de Nemours & Co., Wilmington, Del.

AGITATOR EQUIPMENT
Moore & White Co., Philadelphia, Pa.

AIR CONDITIONING AND CONTROL APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

ALKALI
Diamond Alkali Co., Pittsburgh, Pa.
Wing & Evans, 22 William St., N. Y. C.

ANGLE VALVES
The Crane Company, Chicago, Ill.

ARCHITECTS
James L. Carey, 208 N. Laramie St., Chicago.
L. A. DeGuere, Wisconsin Rapids, Wis.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
George F. Hardy, 309 Broadway, New York City.
V. D. Simons, 39 S. La Salle St., Chicago.
Jos. H. Wallace & Co., Temple Ct. Bldg., New York City.

ASH CONVEYORS
Green Eng. Co., East Chicago, Ind.

ASSORTING TABLES
Moore and White Co., Philadelphia, Pa.

AUTOMATIC COOKING CONTROL
Trimbey & Allen, Glens Falls, N. Y.

BALL CHECK VALVES
The Draper Mfg. Co., Port Huron, Mich.

BALLS (Brass)
The Draper Mfg. Co., Port Huron, Mich.

BALLS (Iron and Steel)
The Draper Mfg. Co., Port Huron, Mich.

BANDLESS ROLLS
Valley Iron Works Co., Appleton, Wis.

BARKERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.

BEARINGS
T. B. Wood's Sons Co., Chambersburg, Pa.

BEARINGS (Ball)
S. K. F. Industries, 165 Broadway, New York.

BEATER BARS
John W. Bolton & Sons, Inc., Lawrence, Mass.

BEATER BED PLATES
John W. Bolton & Sons, Inc., Lawrence, Mass.

BEATER ROLL FILLING
John W. Bolton & Sons, Inc., Lawrence, Mass.

BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Hoist Co., Dayton, Ohio.
Holyoke Machine Co., Holyoke, Mass.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

BEATERS (Continuous)
Claflin Engineering Co., Lancaster, Ohio.

BELT DRIVES
The Link Belt Co., Chicago, Ill.
T. B. Wood's Sons Co., Chambersburg, Pa.

BELT LACING
Flexible Steel Lacing Co., 4875 Lexington St., Chicago.

BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

BLEACHING POWDER
Pennsylvania Salt Mfg. Co., Philadelphia.

BLEACHING (Propellers)
Moore and White Co., Philadelphia, Pa.

BLOWERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee,
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

BOARD MACHINES
Beloit Iron Works, Beloit, Wis.
Black-Clawson, Hamilton, Ohio.
Valley Iron Works, Appleton, Wis.

BOILERS
J. F. Davis, Chicago.

BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Lindsay Wire Weaving Co., Cleveland, Ohio.
W. S. Tyler Co., Cleveland, Ohio.

BRIMSTONE
Union Sulphur Co., 17 Battery Place, New York City.

BRONZE CASTINGS
Eastwood Wire Mfg. Co., Belleville, N. J.

BUCKETS (Elevator)
Hendrick Mfg. Co., Carbondale, Pa.

BUNDLING PRESSES
Hudson-Sharp Mach. Co., Green Bay, Wis.

BURRS
F. W. Roberts Mfg. Co., Inc., Lockport, N. Y.

CALENDERS
Beloit Iron Works, Beloit, Wis.
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.
Smith & Winchester Mfg. Co., So. Windham, Conn.

CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N.Y.

CALENDER ROLLS
Holyoke Machine Co., Holyoke, Mass.

CASEIN
Casein Mfg. Co., New York City.

CASTINGS (Iron & Brass)
Knowlton Machine Co., Westbrook, Me.
Smith & Winchester Mfg. Co., So. Windham, Conn.

CAUSTIC SODA
Diamond Alkali Co., Pittsburgh, Pa.
Wing & Evans, Inc., 22 Williams St., New York.

CEMENT
Smith & Winchester Mfg. Co., So. Windham, Conn.

CENTRIFUGAL PUMPS
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
E. M. Cross Mach. Co., Berlin, N. H.
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

CHAIN DRIVES
Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.

CHAIN GRATES
Green Eng. Co., East Chicago, Ind.

CHEMICALS
Diamond Alkali Co., Pittsburgh, Pa.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
The Grasselli Chemical Co., Cleveland, Ohio.
Wing & Evans, Inc., 22 Williams St., New York.

CHIMNEYS (Metal)
Littleford Bros., Cincinnati, O.

CHIPPERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.

CHIPPER AND BARKER KNIVES
John W. Bolton & Sons, Inc., Lawrence, Mass.

CLAYS AND FILLERS
Daniel M. Hicks, 200 Fifth Ave., New York City.

CHLORINE (Liquid)
The Mathieson Alkali Works (Inc.), 25 W. 43rd St., New York City.

COAL BUNKERS
The Brownhoist Co., Cleveland, Ohio.

COAL & ASH HANDLING SYSTEMS
Link Belt Co., Chicago.

COATING MACHINES
Mayer Coating Machines Co., Rochester, N. Y.

COATED PAPERS
Dana T. McIver, 116 S. Michigan Ave., Chicago
Watervliet Paper Co., Watervliet, Mich.

COLLAPSING REELS
Hudson-Sharp Mach. Co., Green Bay, Wis.

COMPRESSORS (Air)
Plant Eng. & Equip. Co., 11 John St., New York City.

CONSISTENCY REGULATOR
Trimbey Machine Works, Glens Falls, N. Y.

CONSULTING ENGINEERS
James L. Carey, 208 N. Laramie St., Chicago, Ill.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
L. A. De Guere, Wisconsin Rapids, Wis.
George F. Hardy, 309 Broadway, New York City.
Management Eng. & Dev. Co., Dayton, Ohio.
V. D. Simons, 39 S. La Salle St., Chicago.
Jos. H. Wallace & Co., Temple Ct. Bldg., New York City.

CONSULTING ENGINEERS (Power)
B. M. Baxter, Kirby Bldg., Cleveland.
Plant Eng. & Equip. Co., 11 John St., New York City.
V. D. Simons, 39 S. La Salle St., Chicago.

CONVEYORS
Knowlton Machine Co., Westbrook, Me.
Link-Belt Co., Chicago, Ill.

CORES (Collapsible)
Smith & Winchester Mfg. Co., So. Windham, Conn.

COUPLINGS (Shaft)
T. B. Wood's Sons Co., Chambersburg, Pa.

CRANES
The Brownhoist Co., Cleveland, Ohio.
Northern Engineering Works, Detroit, Mich.
The Link Belt Co., Chicago, Ill.

CREPE MACHINES
Hudson-Sharp Mach. Co., Green Bay, Wis.

CUTTERS
Smith & Winchester Mfg. Co., So. Windham, Conn.

CYLINDER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

CYLINDER MOLDS
Appleton Wire Works, Appleton, Wis.
Beloit Iron Works, Beloit, Wis.
Cheney Bigelow Wire Works, Springfield, Mass
Eastwood Wire Mfg. Co., Belleville, N. J.
Glens Falls Machine Works, Glens Falls, N. Y.
The Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, Ohio.

DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Central Mfg. Co., Kalamazoo, Mich.
Cheney Bigelow Wire Works, Springfield, Ohio
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
The W. S. Tyler Co., Cleveland, Ohio.

DIE PRESSES
Smith & Winchester Mfg. Co., So. Windham, Conn.

DIGESTERS
The Biggs Boiler Works Co., Akron, O.

DRAFT GAUGES
The Foxboro Co., Foxboro, Mass.

DRUM WINDERS
Beloit Iron Works, Beloit, Wis.
Ticonderoga Machine Co., Ticonderoga, N. Y.

DRYERS
Smith & Winchester Mfg. Co., So. Windham, Conn.

DRYER EXHAUST
Nash Engineering Co., So. Norwalk, Conn.

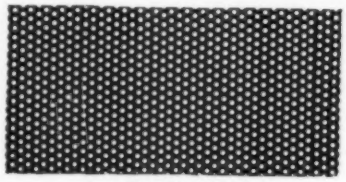
DRYER FELTS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons.
Lockport Felt Co., Lockport, N. Y.
Shuler and Benninghofen, Hamilton, Ohio.

DYESTUFFS
E. I. Du Pont de Nemours & Co., Wilmington, Del.
H. A. Metz & Co., Inc., 122 Hudson St., New York City.
The Newport Chemical Works, Inc., Passaic, N. J.
Standard Ultramarine Co., Huntington, W. Va.
Sandoz Chemical Works, 238 Water St., New York City.
The White Tar Aniline Corp., 56 Vesey St., New York City.

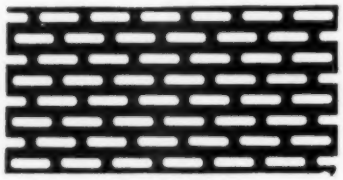
DUST COLLECTING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.

ELECTRIC HOISTS
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich.

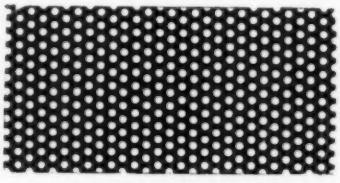
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



⅛ x ½" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.

"TYLER"

CORDUROY CLOTH

for SAVEALLS
GROUND WOOD WET MACHINES
WATER FILTERS
SULPHITE WET MACHINES

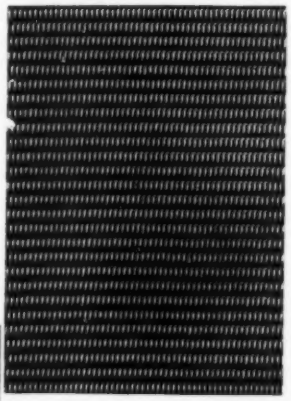
Tyler Corduroy Cloth, for use in the paper making industry, has four distinct advantages over otker types of screen, namely:

1—It eliminates the necessity of using backing wires.
2—It gives much longer life than fine face wire.
3—There is no chance for stock to collect between the two covers which occurs where a fine wire and a backing wire are used.
4—Eliminating the backing wire, saves considerable time in applying the cloth to the machine.

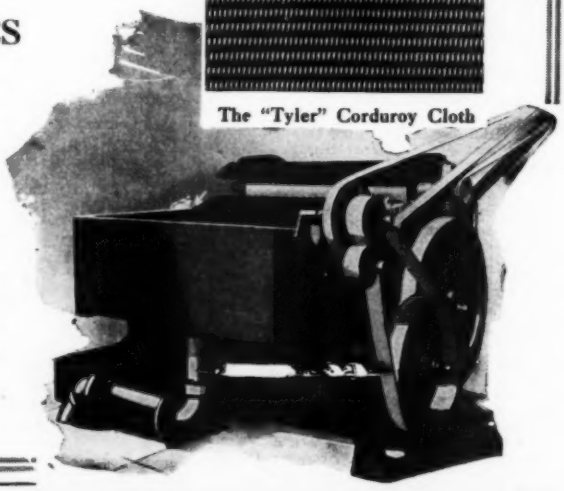
Tyler Corduroy Cloth is made from phosphor bronze, monel, or nickel wire, and is carried in stock in all widths up to and including 150 inches.

Samples will be sent upon request.

Also Manufacture Fourdrinier Wires, Cylinder Faces, Washer Wires, Backing Wires



The "Tyler" Corduroy Cloth



THE W. S. TYLER COMPANY
CLEVELAND, OHIO

WE-FU-GO AND SCAIFE WATER

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ELEVATORS
Link Belt Co., Chicago

ENGINES
American Blower Co., Detroit, Mich.
The Brownell Co., Dayton, O.

ENGINEERS
B. M. Baxter, 5716 Euclid Ave., Cleveland, O.
James L. Carey, 208 North Laramie St., Chicago, Ill.
George F. Hardy, 309 Brodway, New York City.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
V. D. Simons, 39 S. La Salle St., Chicago.
Stebbins Engineering & Mfg. Co., Watertown, N. Y.
Jos. H. Wallace & Co., Temple Ct. Bldg., New York City.

ENGINEERS (Structural)
Federal Bridge Co., Waukesha, Wis.

EVAPORATORS:
Swenson Evaporator Co., Chicago, Ill.

EXHAUSTERS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.

FANS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowlton Machine Co., Westbrook, Me.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

FELTS AND JACKETS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Newfane, N. Y.
Shuler and Benninghofen, Hamilton, Ohio
Waterbury Felt Co., Skaneateles Falls, N. Y.

FELT ROLLS
Rodney Hunt Machine Co., Orange, Mass.

FELT AND WIRE GUIDES
Moore & White Co., Philadelphia, Pa.

FILTER (Continuous Suction)
Oliver Continuous Filter Co., Los Angeles, Calif.

FILTERS (Pressure and Gravity)
Hungerford & Terry, Inc., Philadelphia, Pa.
Norwood Eng. Co., Florence, Mass.
The Permutit Co., 440 Fourth Ave., N. Y. C.

FLOUR SACK MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

FLUID METERS
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

FOURDRINIER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
The W. S. Tyler Co., Cleveland, Ohio.

FRICTION CLUTCHES
Moore and White Co., Philadelphia, Pa.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
T. B. Wood's Sons Co., Chambersburg, Pa.

FUSE PLUGS
Federal Electric Co., Chicago, Ill.

FUSE WIRE
Federal Electric Co., Chicago, Ill.

FUSES (Cartridge)
Federal Electric Co., Chicago, Ill.

GEARS
Cleveland Worm Gear Co., Cleveland, O.
Foote Bros. Gear & Machine Co., 250 N. Curtis St., Chicago, Ill.
Knowlton Machine Co., Westbrook, Me.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.

GLUES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

GRANITE ROLLS
Jones Bros. Co., Barre, Vt.

GREASE CUPS
Hunter Pressed Steel Co., Lansdale, Pa.

GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Holyoke Machine Co., Holyoke, Mass.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

GUMMING AND GLUEING MACHINES
Mayer Coating Machines Co., Rochester, N. Y.

HANGERS
T. B. Wood's Sons Co., Chambersburg, Pa.

HEATING SYSTEMS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Skinner Bros. Co., 1444 S. Vandeventer Ave., St. Louis, Mo.

HOISTING AND CONVEYING SYSTEMS
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich.

HYDRAULIC TURBINES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.

INSTRUMENTS (Fluid Meter)
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

IRON CASTINGS
Beloit Iron Works, Beloit, Wis.
Knowlton Machine Co., Westbrook, Me.
Valley Iron Works Co., Appleton, Wis.

JORDAN ENGINES
Smith & Winchester Mfg. Co., So. Windham, Conn.
Shartle Bros. Machine Co., Middletown, Ohio.

JORDAN FILLINGS
J. W. Bolton & Sons, Inc., Lawrence, Mass.
Jones & Sons Co., E. D., Pittsfield, Mass.
The Shartle Bros. Mach. Co., Middletown, O.

KETTLES (Steam Jacketed)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

KNIVES
John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Mfg. Co., Fitchburg, Mass.

KNIFE GRINDERS
Sam'l C. Rogers & Co., Buffalo, N. Y.

KRAFT AND SULPHATE PULPS
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

LAYBOYS
Moore and White Co., Philadelphia, Pa.

LIQUID CHLORINE
The Mathieson Alkali Works (Inc.), 25 W. 43rd St., New York City.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

MECHANICAL PULP
J. Andersen & Co., 21 E. 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

METERS
Plant Eng. & Equip. Co., 11 John St., New York City.

METERS (Fluid)
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

MILL ARCHITECTS
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

MIXING SYSTEM
Trimbey Machine Works, Glens Falls, N. Y.

MILL WHITE
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.

NAPKIN FOLDERS
Hudson-Sharp Mach. Co., Green Bay, Wis.

NAVAL STORES
Hercules Powder Co., Wilmington, Del.

OIL CUPS
Hunter Pressed Steel Co., Lansdale, Pa.

OIL MEASURING SYSTEMS
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.

OIL STORAGE SYSTEMS
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.

OVERHEAD CARRYING SYSTEMS
Louden Mfg. Co., Fairfield, Iowa.

PAINTS
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.

PAPER BAG MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

PAPER BOARDS
C. L. La Boiteaux, 200 Fifth Ave., N. Y. C.
Dana T. McIver, 116 N. Michigan Ave., Chicago.

PAPER CUTTERS & SLITTERS
Beloit Iron Works, Beloit, Wis.
Hamblet Machine Co., Lawrence, Mass.
Smith & Winchester Mfg. Co., South Windham, Conn.

PAPER DISTRIBUTORS
Coy, Disbrow & Co., Inc., 309 Canal St., New York City.
Dana T. McIver, 116 N. Michigan Ave., Chicago.

PAPER EXPORTERS AND IMPORTERS
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.

PAPER MACHINES
Beloit Iron Works, Beloit, Wis.
The Black-Clawson Co., Hamilton, O.
Pusey & Jones Co., Wilmington, Del.
Smith & Winchester Mfg. Co., South Windham, Conn.
Valley Iron Works, Appleton, Wis.

PAPER MACHINE DRIVES
Harland Eng. Co., Montreal, Can.

PAPER MANUFACTURERS
Eastern Manufacturing Co., 501 Fifth Ave., N. Y. City.
Hammermill Paper Co., Erie, Pa.
Marathon Paper Co., Rothschild, Wis.
Munising Paper Co., Munising, Mich.
Oxford Paper Co., 200 Fifth Ave., N. Y. City.
Poland Paper Co., 200 Fifth Ave., New York
Watervliet Paper Co., Watervliet, Mich.
Wausau Sulphate Fibre Co., Mosinee, Wis.
Wolverine Paper Co., Otsego, Mich.

PAPER MANUFACTURERS' SUPPLIES
J. Andersen & Co., 21 East 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.
Diamond Alkali Co., Pittsburgh, Pa.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Mendelson Bros. Paper Stock Co., 910 Michigan Ave., Chicago.
Paper Trading Co., Boston, Mass.
Penn Paper Stock Co., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perkins-Goodwin Co., 33 W. 42nd St., N. Y. C.

PAPER STOCK CUTTERS
Taylor, Stiles & Co., Riegelsville, N. J.

PAPER TESTERS
Thwing Instrument Co., 3353 Lancaster Ave., Philadelphia, Pa.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.

PENSTOCKS
The Biggs Boiler Works Co., Akron, O.

PERFORATED METALS
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, 57 Fairmount Ave., Jersey City, N. J.

PULLEY BLOCKS
T. B. Wood's Sons Co., Chambersburg, Pa.

PIPE RIVETED STEEL
American Spiral Pipe Works, 14th St. and 48th Ave., Chicago.
The Biggs Boiler Works, Akron, O.

PIPING EQUIPMENT
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PIPING SYSTEMS INSTALLED
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PIPE THREADING & CUTTING MACHINERY
Toledo Pipe Threading Machine Co., Toledo, O.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

POWER TRANSMISSION
Dodge Mfg. Co., Mishawaka, Ind.
Link-Belt Co., Chicago, Ill.
The Hill Clutch Co., Cleveland, Ohio.
Rodney Hunt Machine Co., 45 Mill St., Orange, Mass.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
Valley Iron Works, Williamsport, Pa.
T. B. Wood's Sons Co., Chambersburg, Pa.

Holyoke Machine Co. HOLYOKE MASS.

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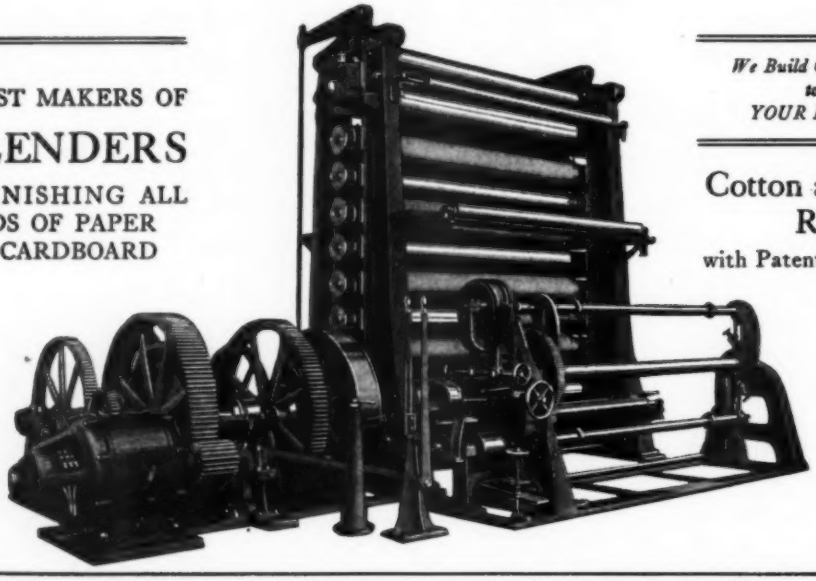

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Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

PRESS ROLLS
Rodney Hunt Machine Co., Orange, Mass.

PULLEYS
J. B. Wood's Sons Co., Chambersburg, Pa.

PULP (Chemical)
J. Andersen & Co., 21 East 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.
M. Gottesman & Co., 18 E. 41st St., New York City.
Daniel M. Hicks, 200 Fifth Ave., New York City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Price & Pierce, Ltd., 30 East 42nd St., New York City.
The Pulp & Paper Trading Co., 21 East 40th St., New York City.
Scandinavian-American Trading Co., 50 East 42d St., New York City.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.

PULP AND PAPER MILL MACHINERY
Beloit Iron Works, Beloit, Wis.
The Biggs Boiler Works Co., Akron, O.
The Black-Clawson Co., Hamilton, Ohio.
Davis, Frank H., Cambridge, Mass.
Glens Falls Machine Co., Glens Falls, N. Y.
Improved Paper Machinery Co., Nashua, N. H.
Moore & White Co., Philadelphia, Pa.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Noble & Woods Machine Co., Hoosick Falls, N. Y.
Pusey & Jones Co., Wilmington, Del.
The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

PULP GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.

PUMPS (Stock)
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.
Glens Falls Machine Co., Glens Falls, N. Y.
Gregg Pump Co., Kansas City, Mo.
Plant Eng. & Equip. Co., 11 John St., New York City.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Centrifugal)
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Cross, E. M., Mach. Co., Berlin, N. H.
Fairbanks, Morse & Co., 900 Wabash Ave., Chicago, Ill.
Hayton Pump & Blower Co., Appleton, Wis.
Plant Eng. & Equip. Co., 11 John St., New York City.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Deep Well)
Gregg Pump Co., Kansas City, Mo.
Plant Eng. & Equip. Co., 11 John St., New York City.

PUMPS (Vacuum)
American Steam Pump Co., Battle Creek, Mich.
Nash Eng. Co., South Norwalk, Conn.
Plant Eng. & Equip. Co., 11 John St., New York City.

RAG AND PAPER DUSTERS
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.

REELS
Smith & Winchester Mfg. Co., So. Windham, Conn.

ROLLER BEARINGS
S. K. F. Industries, 165 Broadway, N. Y. C.

ROOF DRYING SYSTEMS
Clarage Fan Co., Kalamazoo, Mich.

ROOFS
U. S. Gypsum Co., Wells & Monroe Sts., Chicago, Ill.

ROPE DRIVES
Dodge Mfg. Co., Mishawaka, Ind.
T. B. Wood's Sons Co., Chambersburg, Pa.

ROTARY BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

ROZIN
Hercules Powder Co., Wilmington, Del.

SAVE-ALLS
Glens Falls Machine Co., Glens Falls, N. Y.

SAWS
Simonds Mfg. Co., Fitchburg, Mass.

SCALES
Fairbanks-Morse & Co., 900 Wabash Ave., Chicago, Ill.

SCREENS
The Bagley & Sewall Co., Watertown, N. Y.
Union Iron Works, Bangor, Me.

SCREENS (Perforated Metal)
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, 57 Fairmount Ave., Jersey City, N. J.

SCREEN PLATES
Central Mfg. Co., Kalamazoo, Mich.
William A. Hardy & Sons, Fitchburg, Mass.
Union Screen Plate Co., Fitchburg, Mass.

SHAFTING
T. B. Wood's Sons Co., Chambersburg, Pa.

SHOWER PIPES
Smith & Winchester Mfg. Co., So. Windham, Conn.

SILENT CHAIN DRIVES
The Link Belt Co., Chicago, Ill.

SIZE
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

SLITTING AND REWINDING MACHINERY
Beloit Iron Works, Beloit, Wis.
Cameron Machine Co., Brooklyn, N. Y.
Hamblet Machine Co., Lawrence, Mass.
Samuel M. Langston Co., Camden, N. J.

SMOKE STACKS (Steel)
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

SOOT BLOWERS
Diamond Power Specialty Co., Detroit, Mich.

SODA ASH
Diamond Alkali Co., Pittsburgh, Pa.
Wing & Evans, Inc., 22 Williams St., New York.

SPEED CHANGES
Moore and White Co., Philadelphia, Pa.

SPEED REDUCERS
Foote Bros. Gear & Machine Co., 250 N. Curtis St., Chicago, Ill.

SPIRAL PIPE
American Spiral Pipe Works, Chicago.

SPRAY NOZZLES
Buffalo Forge Co., Buffalo, N. Y.

STEEL PLATE CONSTRUCTION
The Biggs Boiler Works Co., Akron, O.
Hendrick Mfg. Co., Carbondale, Pa.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

STEEL PRODUCTS (Fabricated)
Federal Bridge Co., Waukesha, Wis.

STOCK CIRCULATING SYSTEM
Claflin Engineering Co., Lancaster, Ohio.
Ticonderoga Machine Works, Ticonderoga, N.Y.

STOCK METER
Trimbey Machine Works, Glens Falls, N. Y.

STOCK PUMPS
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.

STORAGE TANKS
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

STRAINERS
A. D. Cook, Lawrenceburg, Ind.
Plant Eng. & Equip. Co., 11 John St., New York City.

SULPHITE (Strong Bleached and Easy Bleaching)
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

SULPHITE MACHINERY
The Biggs Boiler Works Co., Akron, O.

SULPHUR
Union Sulphur Co., 17 Battery Place, New York City.

SULPHUR BURNERS
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

SUPERHEATERS
Plant Eng. & Equip. Co., 11 John St., New York City.

TANKS (Iron and Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

TANKS (Wooden)
Curtis-Willis Co., 30 Church St., New York, N. Y.
Hauser-Stander Tank Co., Cincinnati, O.
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.

TOILET ROLL WINDERS
Hudson-Sharp Mach. Co., Green Bay, Wis.

TRANSMISSION MACHINERY
Dodge Mfg. Co., Mishawaka, Ind.
T. B. Wood's Sons Co., Chambersburg, Pa.

TRAPS
Plant Eng. & Equip. Co., 11 John St., New York City.

TROLLEY SYSTEMS
Louden Mfg. Co., Fairfield, Iowa.

TURBINES (Hydraulic)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.
Rodney Hunt Machine Co., Orange, Mass.
A. Plamondon Mfg. Co., 5301 S. Western Ave., Chicago, Ill.

VACUUM PUMPS
The Nash Eng. Co., South Norwalk, Conn.
Plant Eng. & Equip. Co., 11 John St., New York City.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVE FACING TOOLS
The Draper Mfg. Co., Port Huron, Mich.

VALVES
The Crane Co., Chicago, Ill.
G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, Ill.
Lunkenheimer Co., The, Cincinnati, O.
The Wm. Powell Co., Cincinnati, Ohio.
Record Fdy. & Mach. Co., Livermore Falls, Me.

VAPOR ABSORPTION SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Engineering Corp., 30 E. 42nd St., New York City.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

VARIABLE SPEED ENGINES
The Brownell Co., Dayton, Ohio.

VATS (Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

VENTILATING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowlton Machine Co., Westbrook, Me.
J. O. Ross Engineering Corp., 30 E. 42nd St., New York City.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

WASHER WIRES
The W. S. Tyler Co., Cleveland, Ohio.

WASTE PAPER STOCK
Mendelson Bros. Paper Stock Co., 910 S. Michigan Blvd., Chicago, Ill.

WATER FILTER
Glens Falls Machine Co, Glens Falls, N. Y.
Hungerford & Terry, Inc., Philadelphia, Pa.

WATER POWER EQUIPMENT
Rodney Hunt Mach. Co., 45 Mill St., Orange, Mass.

WATER-SOFTENING AND PURIFYING SYSTEMS
The Permutit Co., 440 Fourth Ave., N. Y. C.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

WATER WHEELS
Rodney Hunt Machine Co., Orange, Mass.
Holyoke Machine Co., Holyoke, Mass.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.

WET MACHINES
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
Smith & Winchester Mfg. Co., So. Windham, Conn.

WOOD PIPE
The Michigan Pipe Co., Dept. 17, Bay City, Mich.
A. Wyckoff & Son Co., Elmira, N. Y.

WOOD ROLLS
Rodney Hunt Mach. Co., 45 Mill St., Orange, Mass.

WIRE SIGNS
Cheney Bigelow Wire Works, Springfield, Mass.

The Noble & Wood Machine Co.

Hoosick Falls, New York

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Paper Mill Machinery

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Hudson Falls
New York

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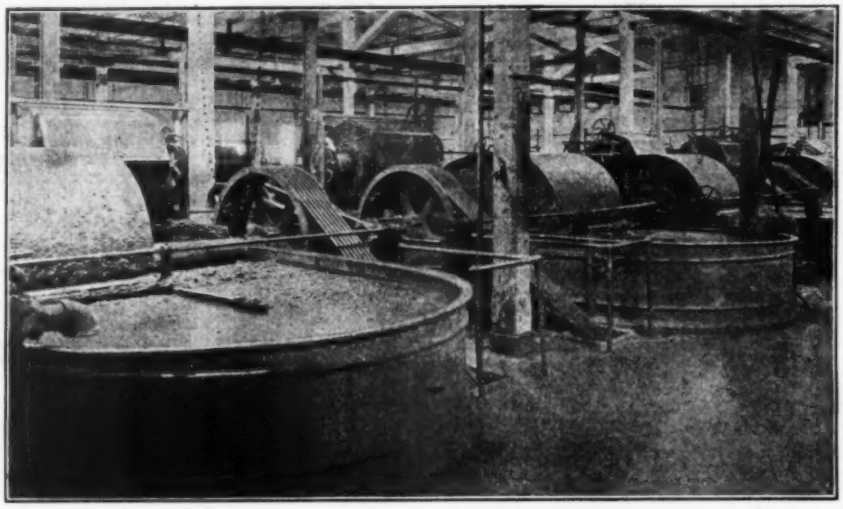

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This system of driving is the only practicable one for the transmission of horse powers beyond the limitations of belting practice. Power is transmitted without slippage, friction losses are minimized, and provisions can be easily made for future increase of power demands.

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Dodge Sales and Engineering Company

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